the OIL AND GAS JOURNAL

WARREN

PEP
POWER
HIGH OCTANE
CONSTANT UNIFORMITY
QUICK STARTING
CORRECT VOLATILITY
SMOOTH ACCELERATION

NATURAL GASOLINE
Chemical Grade
HYDROCARBONS
Iso-Pentane
Normal Butane
Iso-Butane
Propane
Hexane
STA-VOL-ENE

Stabilized Natural Gasoline

WARREN PETROLEUM CORPORATION

Producers, Manufacturers, Exporters and Marketers

Export Terminals: Corpus Christi, Port Arthur, Baytown, Texas City, and Norsworthy, Houston, Texas.

TULSA 2, OKLAHOMA CABLE ADDRESSES: Stavolene, Warren

Crude Oil, Natural Gasoline and Liquefied Petroleum Products

PRICE 50 CENTS

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FEBRUARY 16, 1950

ONE OF OUR BEST SALESMEN

doesn't work for us!

Maybe he's an engineer with one of the oil companies, or a superintendent with a drilling contractor. But he's still one of our best salesmen. He's one of Lane-Wells steady customers who has been using our services for perhaps ten or fifteen years. And our steady customers seem always ready to tell others about Lane-Wells perforating with such expressions as "They do the job *right* the first time"; "I can depend on Lane-Wells"; "They really get penetration"; and "Lane-Wells measurements check, right on the nose". So, if you'd like unbiased dope on perforating,

Ask Him About LANE WELLS *Better Perforating*

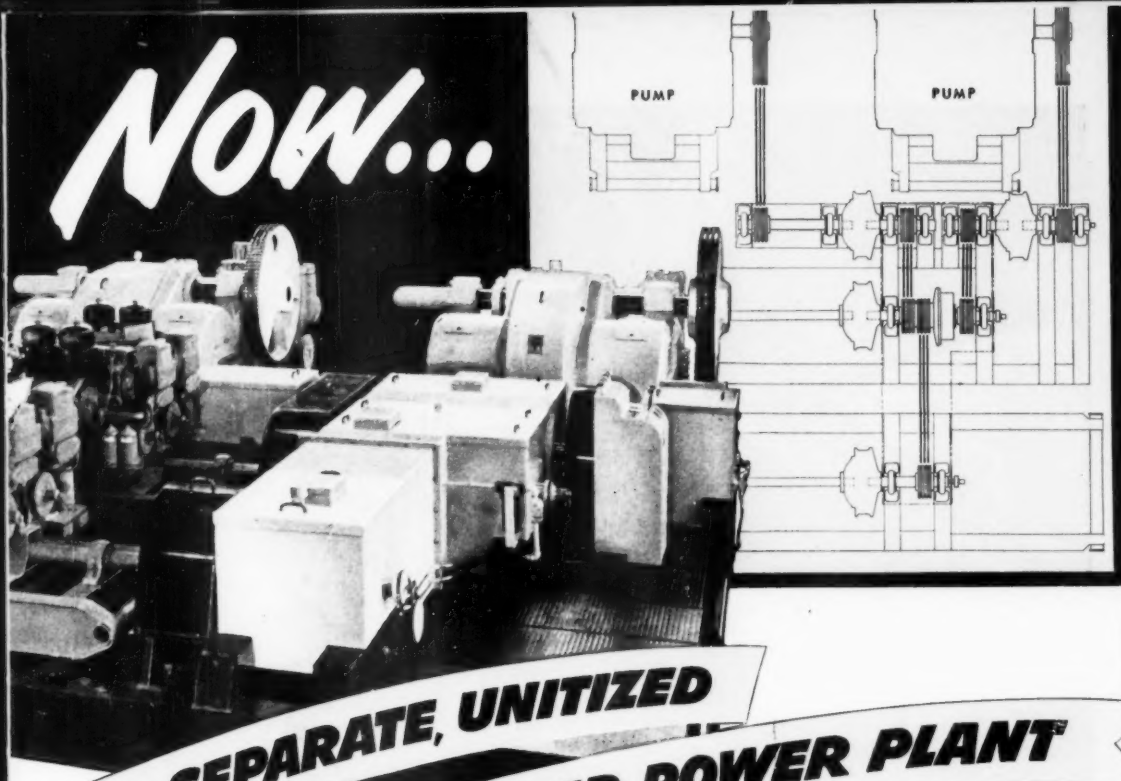
LOS ANGELES • HOUSTON • OKLAHOMA CITY

LANE WELLS CANADIAN COMPANY • PETRO-TECH SERVICE CO. IN VENEZUELA

General Offices, Export Office and Plant • 5610 SO. SOTO STREET, LOS ANGELES 11, CALIFORNIA

AG-302

Now...



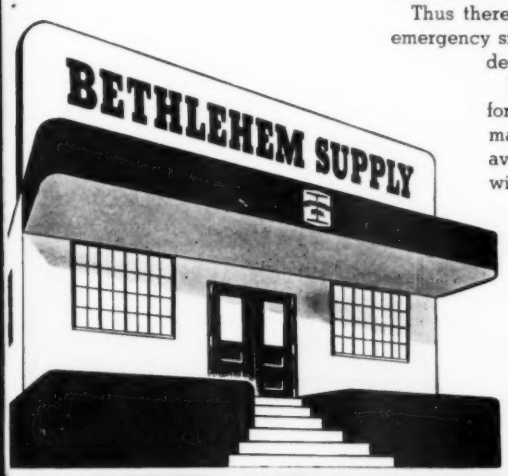
A SEPARATE, UNITIZED SLUSH PUMP POWER PLANT

Here's a compact slush pump hookup that's completely *independent* of your main drilling engines—a unitized hookup that provides greater flexibility, ample volume and pressure at all times, and a wealth of reserve pumping power.

Shown in the photo are a pair of Bethlehem G-600 pumps, rated for deepest drilling; but other combinations are possible and often desirable. With the layout illustrated, two engines are employed. Both engines can be used at once when super-power is needed; both pumps at once when extra volume is needed. Either engine can drive either pump or *both* pumps. The arrangement is entirely divorced from the draw works—the engines run the pumps only.

Thus there's complete standby protection . . . power in abundance for emergency situations . . . more closely-controlled circulation . . . a greater degree of freedom in placing your pumping equipment.

It's an ideal set-up for marine platform drilling where the platform is small and the pumps are barge-mounted. However it has many definite advantages for land drilling, too. Full details are available through our nearest sales office; a Bethlehem engineer will be glad to give you the whole story.



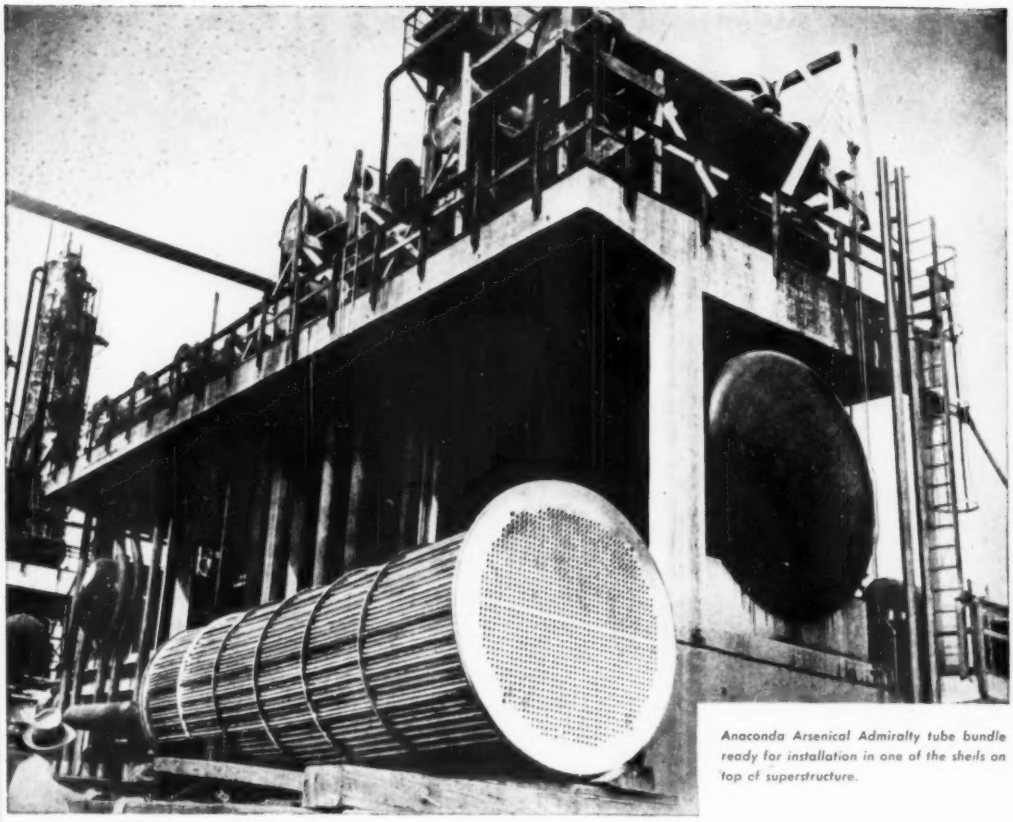
BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second Street, Tulsa, Okla.

Subsidiary of Bethlehem Steel Corporation

On the Pacific Coast Bethlehem Oil-Field Equipment is sold by Bethlehem Supply Company of California

BETHLEHEM STEEL



Anaconda Arsenical Admiralty tube bundle ready for installation in one of the shells on top of superstructure.

Light Hydrocarbon from Fractionating Towers

Handled by ANACONDA ARSENICAL ADMIRALTY TUBES . . .

THE CONDENSERS shown in the photographs above are located at the butadiene plant of Sinclair Rubber, Inc., Houston, Texas. They were built to handle light hydrocarbon from the fractionating towers.

In order to provide the required heat transfer and economical service under the corrosive conditions encountered, the tubes being installed are Anaconda Arsenical Admiralty 439.

This Anaconda Alloy has been manufactured on a commercial basis since 1934. It is but one of 8 standard and several special condenser tube alloys currently produced by The American Brass Company.

This list provides tubes to meet a wide range of heat transfer requirements. The broad metallurgical knowledge and practical experience of our Technical Department is available in helping you make the right selection.

ANACONDA

Anaconda

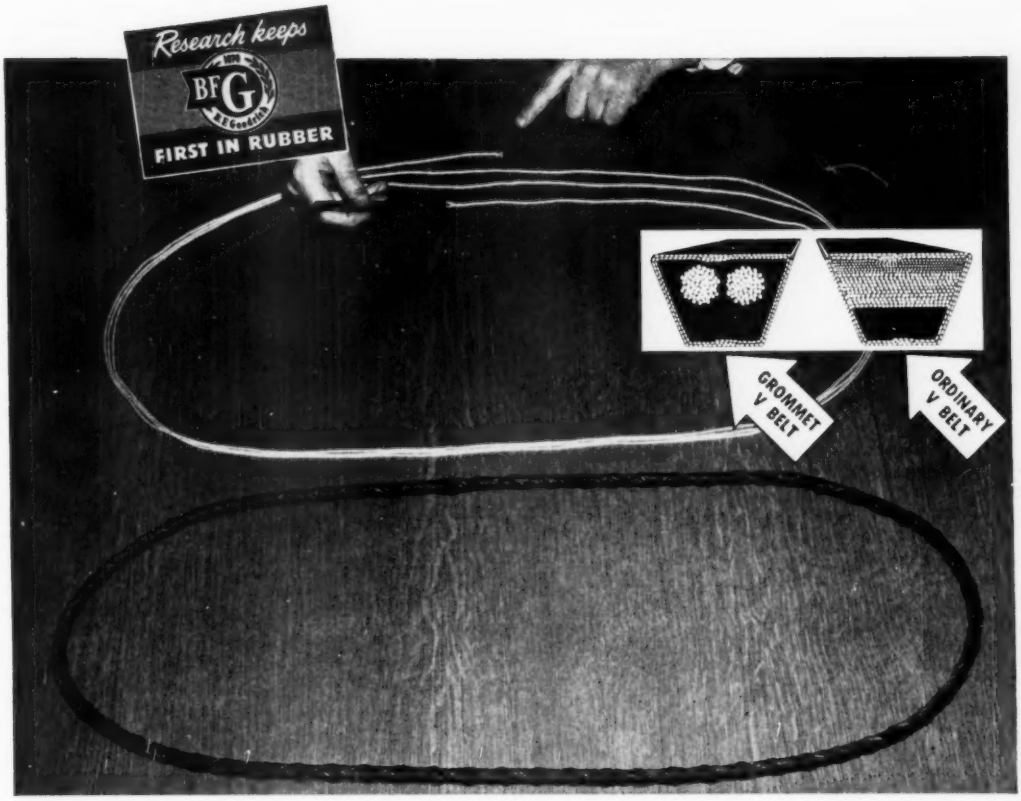
CONDENSER TUBES

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*



How to eliminate most of your V belt cord failures

B. F. Goodrich grommet V belts last 20 to 50% longer, cost no more

IF YOU are now using ordinary V belts, most of your cord failures occur in the overlap section, where cord ends are joined. B. F. Goodrich grommet V belts use *endless* cord grommets, thus do away with the overlap section, eliminate the cord failures that normally occur there. That's one reason why BFG grommet belts last 20 to 50% longer, though they cost *not one cent more!* Here's the whole grommet story —

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends (as in an ordinary V-belt cord section), no stiff, weakened section of "spliced" cord. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. This eliminates "dishing" of cords in the center of the belt, insures full use of all cord strength, maximum power delivery, even load distribution. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

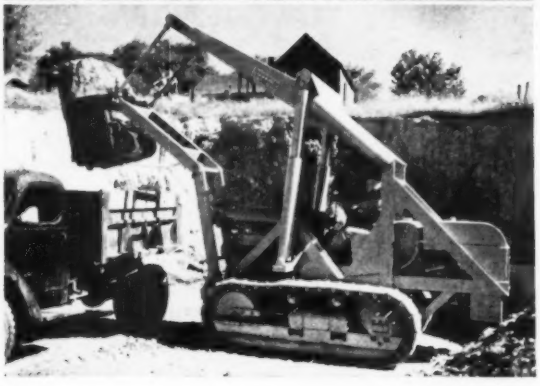
Better grip, less slip — Because a grommet is endless, free of stiff overlap, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet! — Twin grommet construction is an exclusive, patented B. F. Goodrich feature — no other V belt is a grommet V belt. (U. S. Patent No. 2,233,294) To get genuine grommet V belts (at present made in D and E sections only) see your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY
B.F. Goodrich

DEMPSTER DIGGSTER
Now Available With Two Types Of Traction

The revolutionary Dempster-Diggster, which is setting production records everywhere, is now available on crawler-type tractors as well as on the rubber-tired wheel type tractor. Both the rubber-tired and new crawler-type units feature the exclusive hydraulic crowd and hoist action that enables the Diggster to dig out the hardest chert bank . . . that permits digging 15 inches below and 15 feet above surface . . . that permits the bucket to follow the slope of the material in loading or stockpiling. Both units dig . . . load . . . bulldoze with equal efficiency.



If you're looking for a shovel that tackles big and small jobs alike with speed and economy of operation, your best bet is the Dempster-Diggster. It "spins on a dime" . . . loads and dumps faster . . . gets in those "hard-to-get-at" places . . . handles with a fingertip touch. For truck speeds on the road—to and from the job—it's the rubber-tired unit . . . for fast, efficient operation in difficult terrain, it's the new crawler-type unit. One of them is sure to fit your needs. Write today for complete information! A product of Dempster Brothers, Inc.

Photo above shows the new crawler-type Dempster-Diggster with 1 cu. yd. (heaped) digging bucket at its maximum hoisted position. Top photo at left shows the Dempster-Diggster rubber-tired unit digging out a 15 ft. bank of hard chert. Bottom photo at left shows the crawler-type unit ready to dump load into truck.

DEMPSTER DIGGSTER

DEMPSTER BROTHERS

520 Dempster Bldg., Knoxville 17, Tenn.

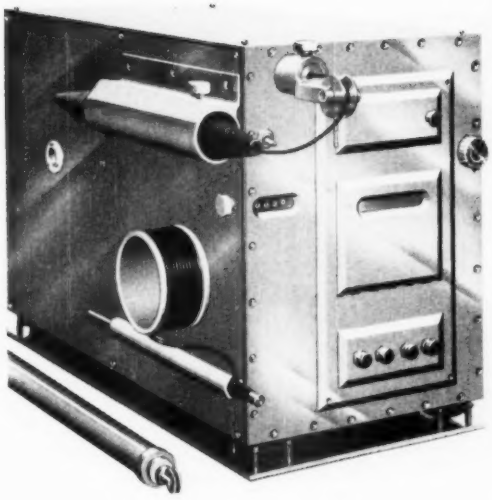
NOW it's a fact!

A PORTABLE-PRACTICAL GEO·LOGGER

THE ELECTRIC WELL-LOGGING UNIT

that is

RUGGED, OPERATOR-PROOF, LOW COST, FAST and ACCURATE



GEO·LOGGER

cuts the cost of information out of every shot or core hole of 1500 feet or less. After two years of development and testing, the portable, operator-proof Geo-Logger is ready to save you time and money. OK'd for design, performance and results by geologists and geophysicists who have seen Geo-Logger in operation.

GEO·LOGGER FITS YOUR PASSENGER CAR

No extra vehicle: Geo-Logger is compact, fits inside trunk compartment of any average passenger car, can be mounted on shooting truck or pick-up. Single aluminum case 18" high, 26" long, 14" wide. Powered by extra belt-driven generator, under hood of car or truck, just above regular generator.

SAVE PERSONNEL, TIME, MONEY

No extra man: Geo-Logger can be set-up and log made by one member of drilling crew. **No extra time:** Geo-Logger gets log of average shot hole (200 feet) in less than 5 min. elapsed time, from start of set-up to out of the hole and out of the crew's way. On a 700-ft. strat test—20 min. elapsed time.

- *EASY TO CARRY*
- *EASY TO USE*
- *EASY TO REPAIR*
- *EASY TO BUY*

ACCURATE, LOW-COST LOGGING COMPARABLE TO SERVICE COMPANY RESULTS!

The Geo-Logger gives you electric logs showing resistivity and self potential curves in holes up to 1500 feet; accuracy in every way comparable to service company logs, obtained at a fraction of their cost. Aids in picking proper position for shot, serves the interpreter of seismic records and locates water supplies for operating departments. The Geo-Logger will stretch current logging budgets; will make possible logging that, heretofore, could not be afforded.

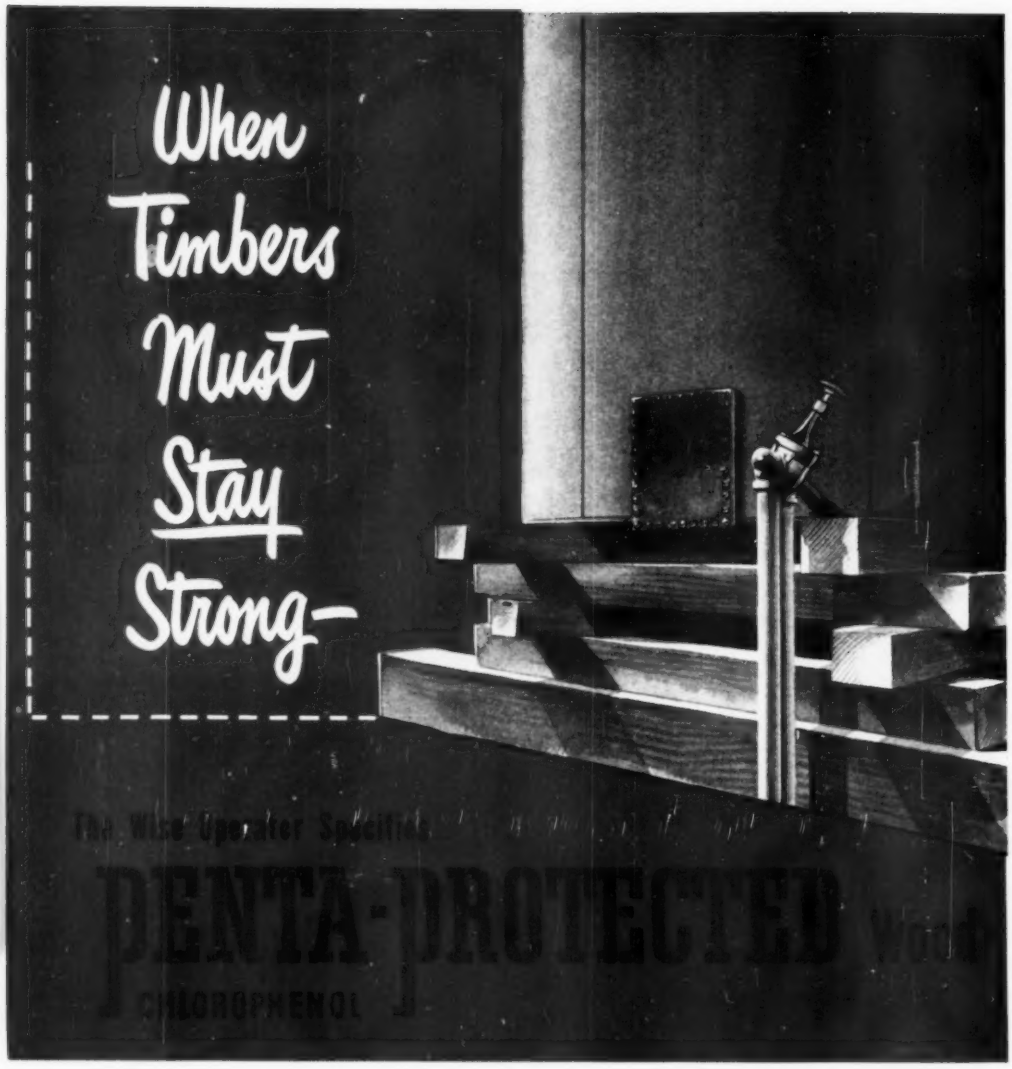
GEO·LOGGER is available now, for sale or lease. Simple, rugged, self-contained, weather-resistant; saves you transportation, men, time, MONEY. For further information, performance records, specifications, write today.

Manufactured by

GEOTRONIC LABORATORIES, INC.

DALLAS, TEXAS

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1950.



Don't take chances with wood-weakening decay and termites! Insist on PENTAchlorophenol-treated lumber for heavily loaded wooden structures. PENTA-treated lumber is scientifically protected against decay and termites. PENTA helps wood keep its original strength for years.

Long-lasting PENTA-protection keeps maintenance and lumber costs down by greatly extending the life of the wood. Tests conducted in the Louisiana lowlands showed PENTA-treated wood still sound after twelve years, while untreated wood lasted only three.

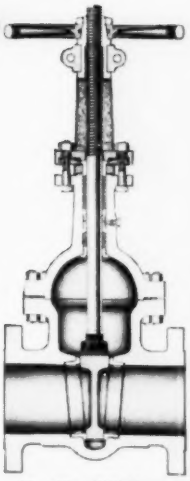
Ask your lumber supplier for PENTA-PROTECTED lumber. Write to Dow, Dept. PE 37 for complete information about this modern wood protectant.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

DOW

penta-
chlorophenol

If it's piping equipment for refineries ...It's in the complete CRANE line



No. 33x, 300-Pound Steel Gate Valve for Oil and Oil Vapor Services Up to 1000° F. Max. Temp. Sizes: 1½ to 24-inch

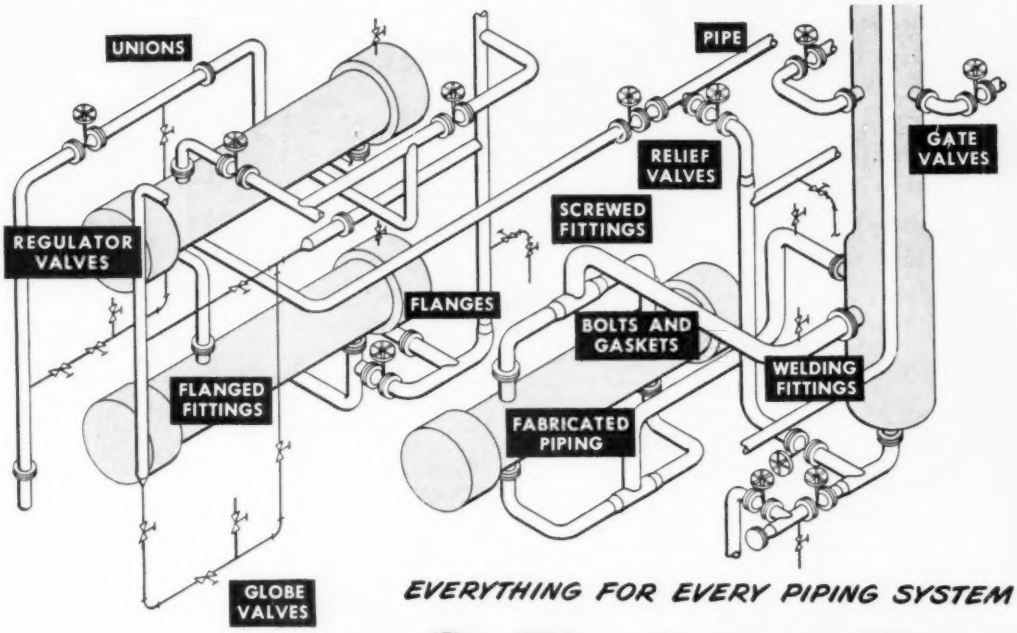
BEST FOR OIL AND OIL VAPOR SERVICES

Crane Cast Steel Wedge Gate Valves find wide application in refineries everywhere because they assure dependable performance under all conditions. Body and bonnet are unusually rugged. Straight-through ports minimize turbulence, erosion and resistance to flow. Full length disc guides insure positive seating on shoulder-type, screwed-in body seat rings.

Strong tee-head disc-stem connection, easily lubricated yoke, and ample non-corrosive bearings assure smooth operation. Made of Carbon or Alloy Steels with trim materials suitable for pressures and temperatures up to 2500 pounds at 1000° F. Flanged, screwed, or welding ends available. See your new No. 49 Crane Catalog.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

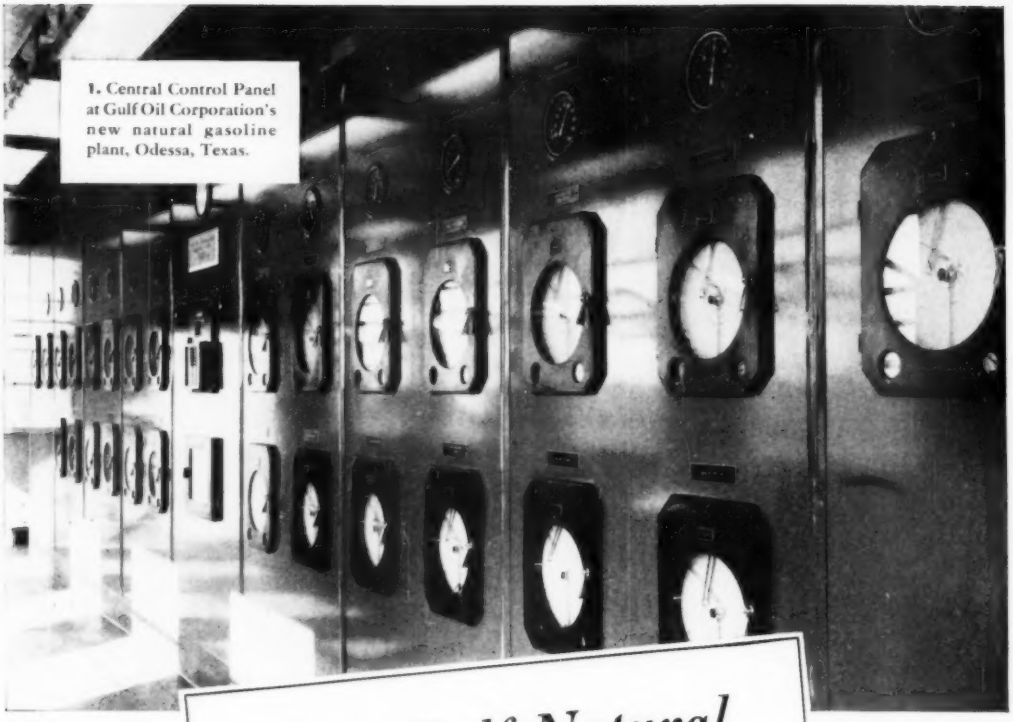
ONE ORDER TO CRANE COVERS ALL PIPING EQUIPMENT FOR THIS VAPOR RECOVERY UNIT HOOKUP, FOR EXAMPLE.



EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING



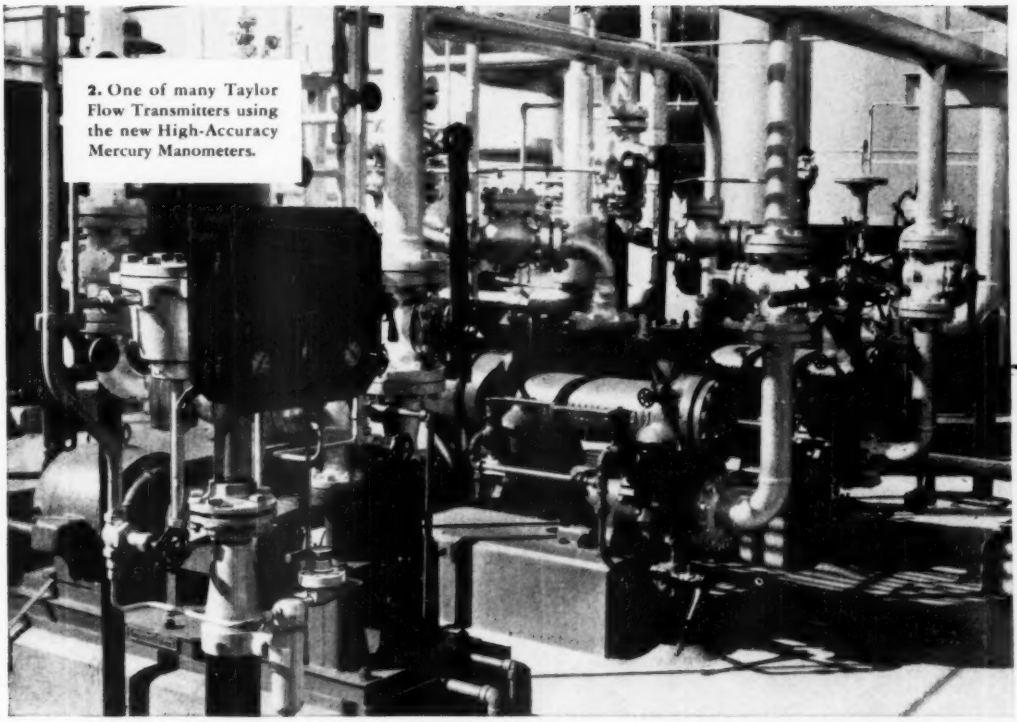
1. Central Control Panel at Gulf Oil Corporation's new natural gasoline plant, Odessa, Texas.

New Gulf Natural Gasoline Plant USES TAYLOR INSTRUMENTATION

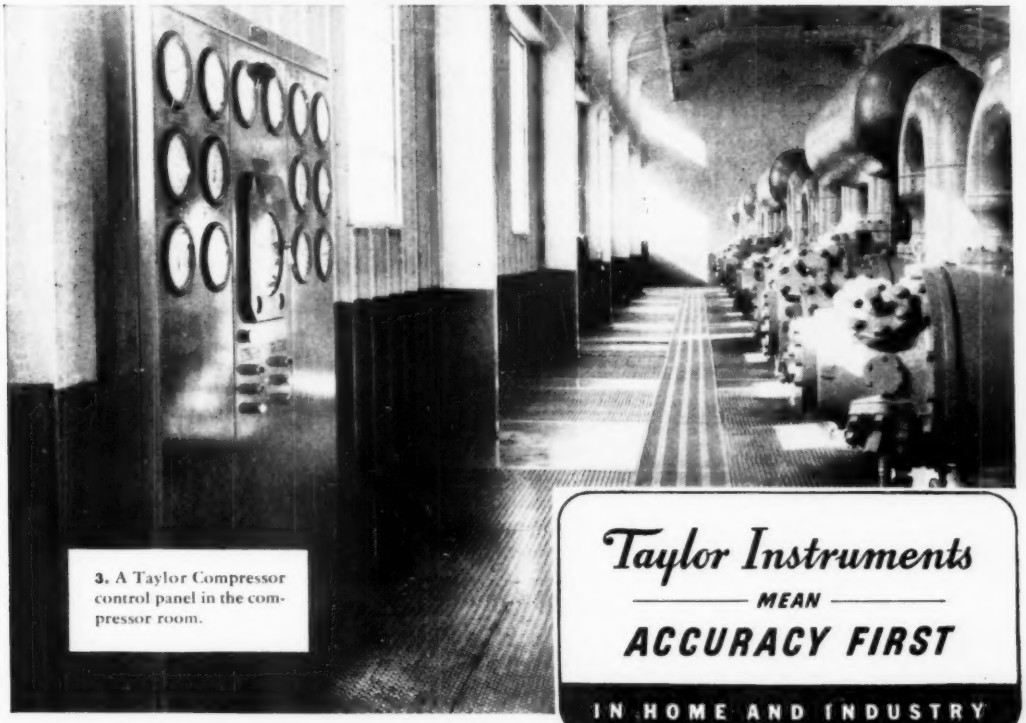
ONE of the show places of the Southwest is the Gulf Oil Corporation's new natural gasoline plant near Odessa, Texas. It now has a Taylor "brain" for measuring and controlling temperatures, pressures, flows and liquid levels. Remote pneumatic transmission systems were used to permit central panel boards. Back at the planning stage the Gulf Oil Corporation, consulting with C F Braun & Co and Bowden Construction Company, builders of the new plant, selected Taylor Instruments for the entire plant. They had the complete cooperation of Taylor Field Engineers from the selection stage to the tuning in of the instruments when going on stream.

The accuracy, simplicity and dependability of Taylor Instruments speak for themselves in terms of higher product quality and lower operating costs. Of particular interest to Gulf were the dependable performance and ease of maintenance of the new Taylor Flow Instruments with High-Accuracy Mercury Manometer with Teflon bearing. Whether your processing problems are simple or complex, there's a Taylor Instrument or control system and a competent Taylor Field Engineer to help you solve them. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.



2. One of many Taylor Flow Transmitters using the new High-Accuracy Mercury Manometers.



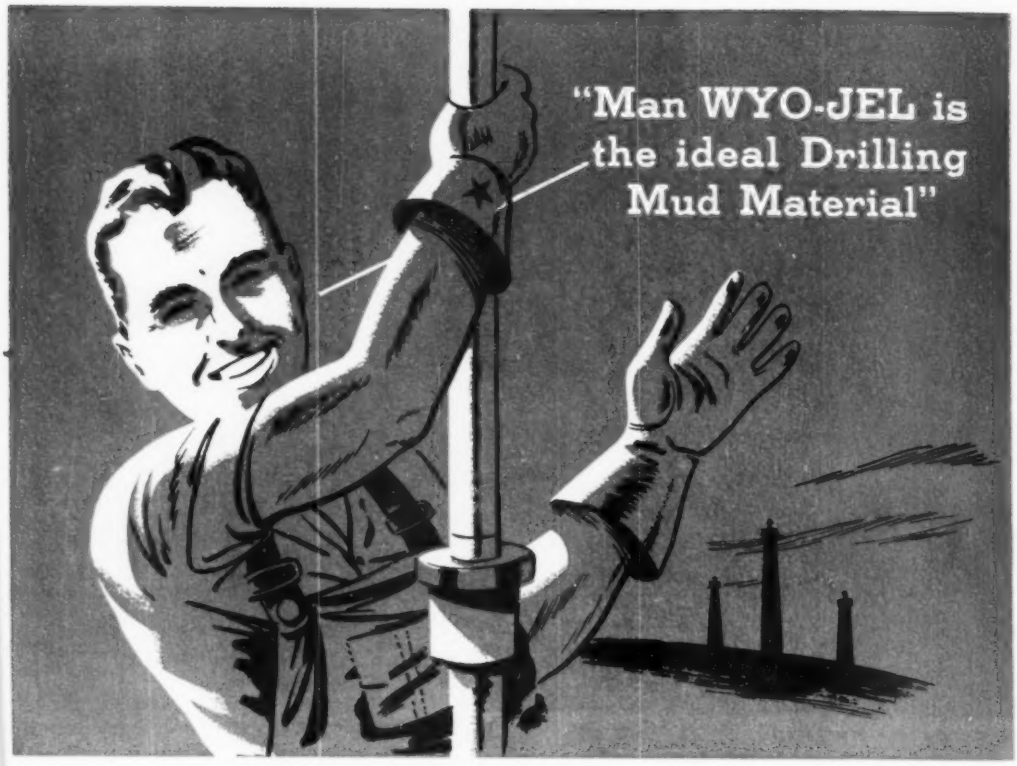
3. A Taylor Compressor control panel in the compressor room.

Taylor Instruments

MEAN

ACCURACY FIRST

IN HOME AND INDUSTRY



"A drilling man like me knows what gives mud a pedigree or as we say — mud with a college education.

"We must keep mud uniform and fluid and the use of Wyo-Jel makes this task much easier . . . also saves us money. Wyo-Jel absorbs tremendous quantities of water and will yield (guaranteed) a minimum of 100 bbls. of mud per ton (at 15 Centipoise Viscosity, with very low water loss). That's a yield, believe me.

"Our dealer tells me Wyo-Jel is made from pure Wyoming Bentonite. Personally I like its fine particle size, the swell suspending qualities and ease of mixing.

"In fact all of the mud users, drillers, mud engineers, tool pushers and drilling superintendents of my acquaintance, recognize Wyo-Jel as an Ideal Drilling Mud Material. They consider it a decided help in reducing drilling costs, increasing drilling efficiency and lengthening the life of drilling mud."

Order Wyo-Jel from your dealer or distributor. Ask us for the folder showing Rotary Mud Tests.

Dealers Attention: If you do not stock Wyo-Jel, we invite you to do so.

THE WYODAK CHEMICAL DIVISION
of THE FEDERAL FOUNDRY SUPPLY COMPANY
4600 East 71st St., Cleveland 5, Ohio

THE WYODAK CHEMICAL DIVISION
4599 Pacific Blvd., Los Angeles (Vernon), Calif.

EXPORT REPRESENTATIVE
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WYO-JEL

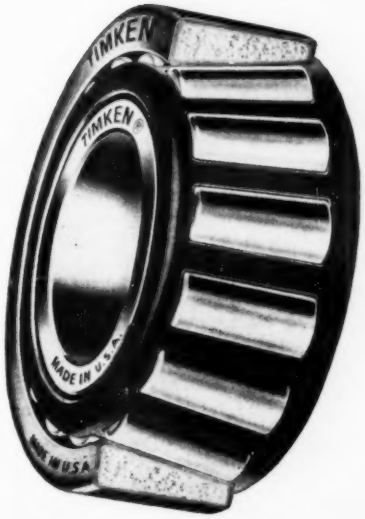
NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN® TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

DUE to its tapered construction, a Timken® bearing takes any combination of radial and thrust loads. No special thrust bearings or washers are needed. Your designs can be simplified, space saved.

Timken bearings hold shafts in rigid alignment, preventing wobble or end-play. Due to precision manufacture and true rolling motion, friction is practically eliminated. And the line contact between rolls and races provides maximum load-carrying capacity.

Made of the finest material ever developed for tapered roller bearings—Timken fine alloy steel—Timken bearings normally last the life of the machines in which they're used.

No other bearing can bring you all the advantages you get with Timken tapered roller bearings. Be sure you have them in the machinery you build or buy. Look for the trade-mark, "Timken" on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".



TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

EASIER TO CARRY THAN AN OUTBOARD MOTOR

THIS FULL-FLEDGED, *Portable Flow Meter* Weighs only *35* Pounds

The Foxboro Portable Flow Meter is equipped with a 5-valve piping manifold; the two extra valves serving to prevent loss of mercury during transportation. The mechanism chamber has a special shipping stop which operates through a stuffing box to clamp the float while meter is carried.

Other exclusive Foxboro Refinements . . . *Sure-Seal Check Valves* positively prevent mercury losses; *Pressure-Tite Bearing* eliminates stuffing box and packing; *Float in High Pressure Chamber* minimizes temperature errors.

Portable Flow Meter Installation on Portable Well Tester

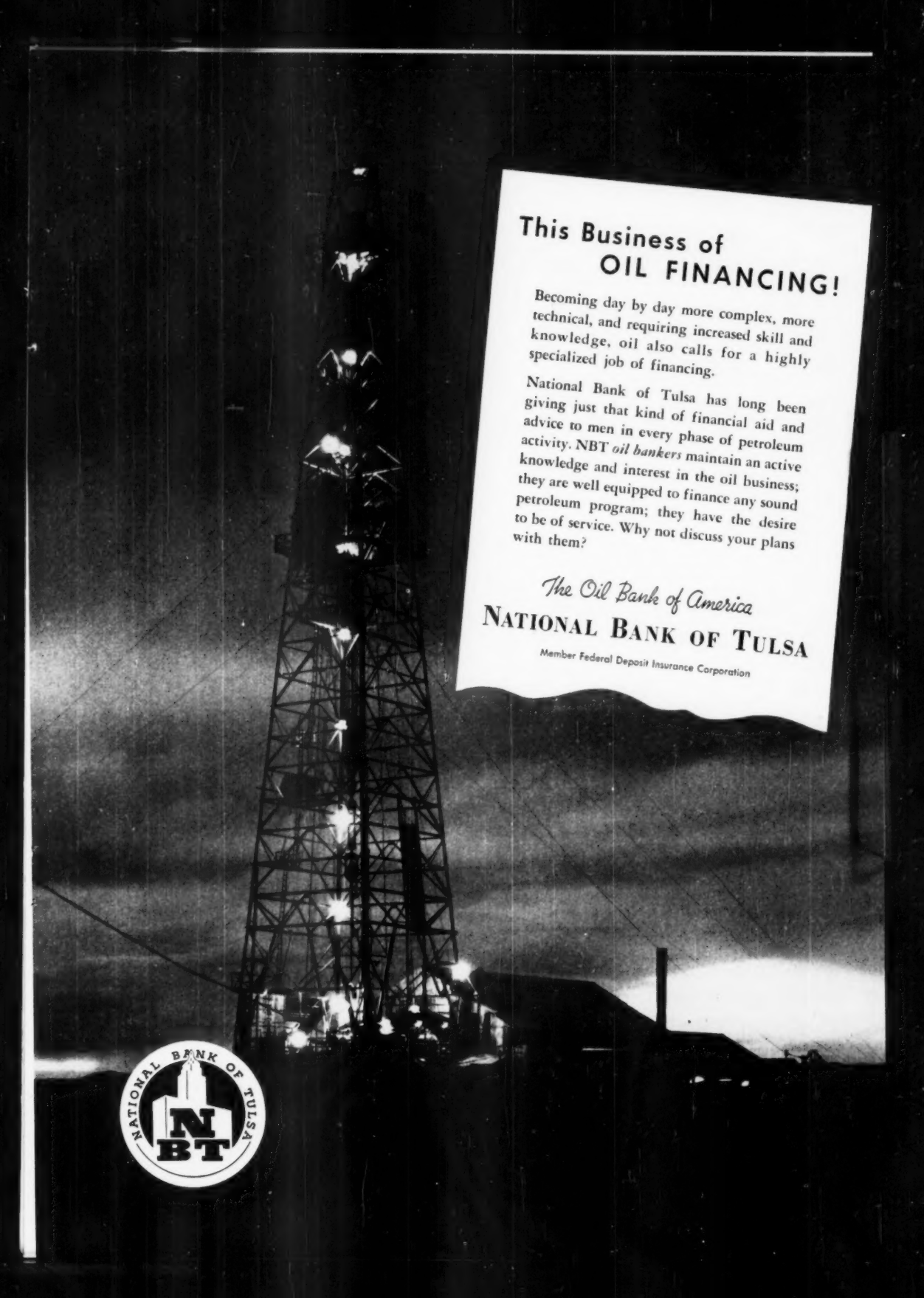
NO WONDER there are so many of these portable flow meters in use! They're designed for portability . . . light, easy to lift and lug . . . yet they're full-sized, standard Foxboro Instruments. These instruments are primarily used for measuring and checking service on pipe lines.

Although they weigh only 35 pounds, they're ruggedly constructed. Their frames are of stout aluminum . . . well-balanced . . . and sturdily supported. Meter chambers are forged steel for 500 or 1000 lbs. working pressure. Differential range is 100" . . . static range as desired.

This mercury float type differential meter affords the best possible protection against overranging and loss of mercury. It is least subject to errors caused by temperature changes. Its calibration is simple . . . testing and checking are less frequently required because there is no occasion for spring-fatigue. Get all the facts. Write **The Foxboro Company, 182 Neponset Avenue, Foxboro, Mass., U. S. A.**

FOXBORO
REG. U. S. PAT. OFF.

DIFFERENTIAL-TYPE FLOW METERS


This Business of
OIL FINANCING!
Becoming day by day more complex, more technical, and requiring increased skill and knowledge, oil also calls for a highly specialized job of financing.
National Bank of Tulsa has long been giving just that kind of financial aid and advice to men in every phase of petroleum activity. NBT *oil bankers* maintain an active knowledge and interest in the oil business; they are well equipped to finance any sound petroleum program; they have the desire to be of service. Why not discuss your plans with them?
The Oil Bank of America
NATIONAL BANK OF TULSA
Member Federal Deposit Insurance Corporation
NATIONAL BANK OF TULSA
NBT

3 more BOVAIRD STORES

to meet your Field Requirements

Bovaird has recently opened stores in Great Bend, Kansas, Ringwood, Oklahoma, and Snyder, Texas in order to meet the field requirements for services and supplies of operators in those territories.

Each Bovaird store maintains complete stocks of the finest nationally known brands of supplies and is manned by personnel capable of efficiently analyzing and filling your supply needs.

OFFICES AND STORES

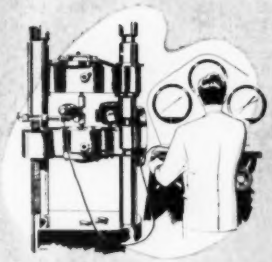
ILLINOIS—Clay City, Grayville, Salem
KANSAS—Chase, Great Bend, McPherson, Pratt, Russell, Wichita
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Ringwood, Sapulpa, Seminole
TEXAS—Borger, Dallas, Odessa, Pampa, Snyder

"Buy From Bovaird"

THE Bovaird SUPPLY CO.

GENERAL OFFICES
TULSA, OKLAHOMA

PREDETERMINING SUCKER ROD SERVICE



The final test of properly selected Jones sucker rods is their ability to provide satisfactory extended service in field operation. Before they leave the factory, every effort is made to be sure that they will meet and surpass requirements.

Rigid tests predetermine compliance with standards well within API specifications. These standards are based on field experience and engineering knowledge accumulated during more than 50 years of leadership. They are your assurance of the best in sucker rods.

*In the new Jones Catalog, the precise production of rods and couplings is illustrated and described. Copies will be sent on request.

***THE S. M. JONES COMPANY**
(Subsidiary of Buffalo Bolt Company)
General Office and Factory: TOLEDO, OHIO
Sales Office: Kennedy Building, Tulsa, Okla.
Export Sales Office: Buffalo International Corp.
50 Church Street, N. Y. C.

IF SALT IS YOUR DRILLING PROBLEM

THESE BAROID PRODUCTS WILL HELP SOLVE IT

IMPERMEX

This organic colloid revolutionized the whole concept of low-water-loss drilling mud. With either fresh or salt water, Impermex improves the filtration qualities of drilling muds. In fact, high concentrations of salt act as a preservative and are used as such.

BAROCO

If salt or similar contaminants are not in high concentration, this inexpensive salt-resisting drilling clay will provide a good drilling mud for a variety of conditions. It's economical, too: a ton makes about 40 barrels of 15-centipoise drilling mud in fresh water. Many operators use Baroco for starting muds and for workovers.

ZEOGEL

This special clay gives stable viscosity and gel characteristics regardless of the concentration of salt. It is widely used in areas such as Kansas and the Permian Basin. If filtration properties are not important, as in some hard rock drilling, straight Zeogel-and-water muds give excellent result.

BAROID EMULSION MUD

Like an oil-emulsion mud? Here's one with exceptional stability and easily controlled gel, viscosity and water-loss properties. Best of all, Baroid Emulsion Mud is not adversely affected by salt and other contaminants, if a high pH is maintained. In fact, maintaining this mud at a pH of 12.8 permits drilling straight through massive salt and finishing with the mud in as good condition as when drilling began.

CHECK WITH YOUR LOCAL BAROID FIELD SERVICE ENGINEER FOR THE BEST WAY TO USE THESE PRODUCTS IN COMBATING SALT WATER DRILLING PROBLEMS IN YOUR DISTRICT

Baroid Sales Division, Department 1
P.O. Box 2258, Terminal Annex, Los Angeles 54, Calif.
Send me detailed information on BAROID drilling muds. I would like to consult the Baroid field engineer in my district in regard to salt water drilling problems.

NAME _____ TITLE _____

COMPANY _____

STREET OR BOX _____

CITY _____ STATE _____

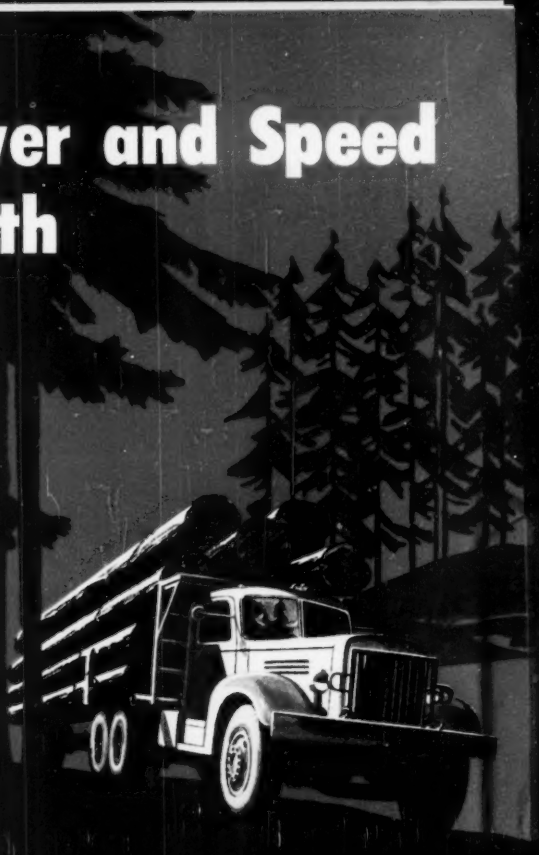
BAROID SALES DIVISION
NATIONAL LEAD COMPANY
LOS ANGELES 12 • TULSA 3 • HOUSTON 1

Extra Pulling Power and Speed in Your Trucks with

EATON

2-Speed Truck

AXLES



In the kind of service that requires extra pulling power and extra speed to make time on the open highway, Eaton 2-Speed Axles provide the perfect balance of power and speed. On trucks that must "take it," Eaton Axles reduce stress and wear—not only on the axles themselves, but on engines and all vital vehicle units. Longer axle life with minimum maintenance cost is assured because Eaton's exclusive forced-feed oiling system provides positive lubrication at all vehicle speeds. Eaton Axles are available for most trucks of 1½ tons and larger. Ask your truck dealer for a road demonstration.

More Than a Million Eaton 2-Speed Axles in Trucks Today

Axle Division

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGTITES SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

Here's what we mean by "Complete Service"

Construction by GRAVER

■ Here's one of the many pipe line pumping stations built *from start to finish* by Graver Construction Co.

Graver constructed the building . . . installed all piping with motor operated valves from the station to the tanks . . . installed all machinery and pumps . . . installed all electrical equipment, switch gears, transformers, and lighting. Graver also put in the macadam roads and sewers . . . built earthen fire walls and leveled the tank yards.

The control room has the latest electrical devices enabling the operator to regulate all valves by push buttons. The room is pressurized to prevent infiltration of vapors.

Make it a point to contact the nearest Graver Construction office and get full details on Graver's *Complete Service*. Get a Graver quotation on your next construction, maintenance, or repair job.

GRAVER

GRAVER CONSTRUCTION CO.

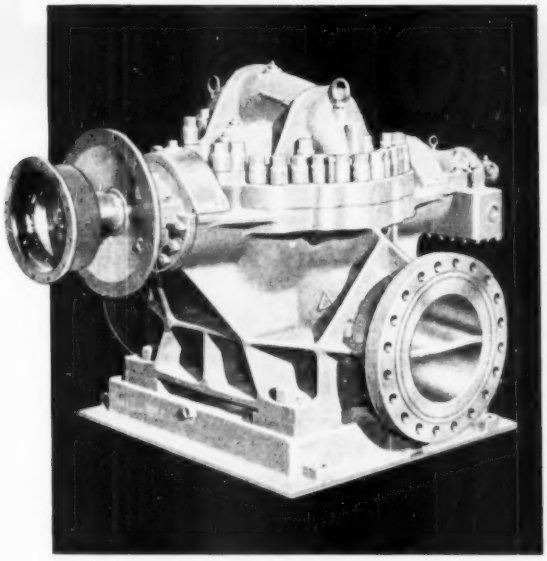
424 Madison Avenue, New York 17, New York

CHICAGO ENGINEERING DEPT.: 880 BERGEN AVENUE, JERSEY CITY, NEW JERSEY HOUSTON

A DIVISION OF GRAVER TANK & MFG. CO. INC. EAST CHICAGO, IND.

BJ PUMP ENGINEERING,

which met the 400,000 barrels-per-day needs of the Trans-Arabian pipe line, can provide the *best* pump for *your* pipe line requirements... large or small.



BJ 16" double volute, double suction pumps, diesel powered, operate in 4-pump series at each booster station, located at 175-mile intervals along the 1050-mile line. These 4-pump teams can deliver 370,000 barrels of oil per 24 hours at 800 lbs. psi. The capacity of this Trans-Arabian line is 50% greater than even the famous Big Inch—and the BJ pumps built for it exceed in size and capacity any pumps previously used in oil line work.

Byron Jackson Co. engineers *know* pipe line pump requirements from years of experience in the petroleum industry. That's why—when it comes to building a pump for *any* pipe line work, BJ builds the *best* pump for the job. The same pump engineering which answered the needs of the world's largest pipe line is ready to work for you—ready to provide better pumping at lower operating cost. For details on this Trans-Arabian pumping operation—or for recommendations on *your* pumping problem—call BJ or use the coupon below.

Byron Jackson Co.

Since 1872

P. O. Box 2017 Terminal Annex, Los Angeles 54, Calif.

OFFICES IN PRINCIPAL CITIES

BJ PUMP DIVISION, DEPT. 26

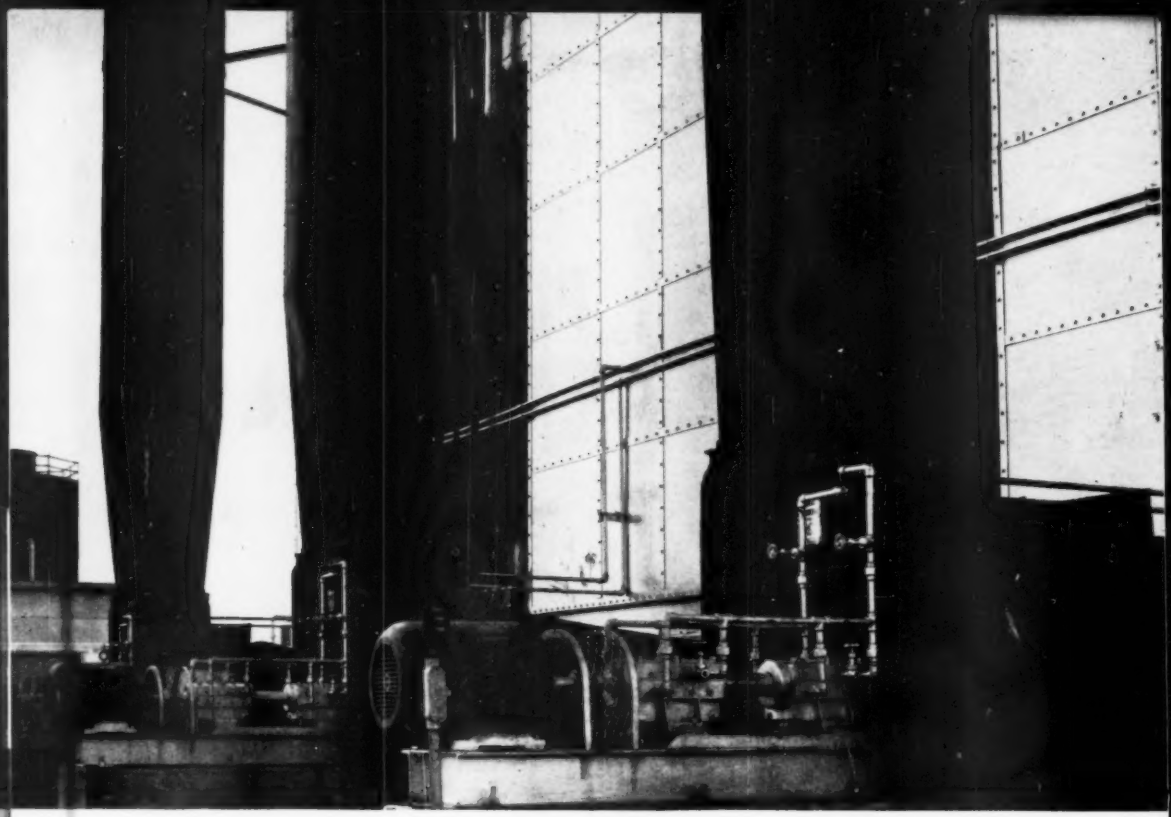
I'd like more detailed information on BJ Pipeline Pumps. Our pumping problem is_____

Name_____

Firm_____

Address_____

City_____ State_____



Husky Housings

SAVED INSTALLATION DOLLARS HERE!

— FURTHER ECONOMIES OFFERED TO YOU IN RUGGED "BUFFALO" INDUCED DRAFT FANS

• This "Buffalo" Induced Draft Fan installation at a prominent Natural Gas Company shows how easily stacks can be mounted on Buffalo fan outlets. The fan housings support the entire weight of the stacks in this economical outdoor installation.

This same rigid, heavy construction pays off in the long, punishing draft job, too. "Buffalo" Induced Draft Fans have extra-heavy housings and blades to stand the continual heat and erosion LONGER. Bearings and shafts are oversize—fully equal to continuous service demands. This means fewer timeouts (and timeouts cost money!). It means fewer repair bills. Yes, "Buffalo" Draft Fans are giving cheaper draft service everywhere because of this inbuilt extra endurance.

BUFFALO FORGE COMPANY
525 Broadway Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Branch Offices in All Principal Cities

Why Not Look

INTO these rugged fans that always save you money in the LONG RUN? Just write for Bulletin 3190-B for all the engineering facts.

"Buffalo" FORCED AND INDUCED DRAFT FANS

Another BWH First!

NEW CONCORD #20 STEAM HOSE

(with Wire Braid Tube!)

BREAKS ALL PERFORMANCE RECORDS!

1. During grueling test, Concord #20 Steam Hose "took it" for 1980 continuous hours of service at 200 lbs. steam pressure!
2. No interruption . . . full flow of steam was maintained during the entire test period. Pressure remained constant at all times!
3. Absolutely no evidence of hardening or swelling of the tube!
4. Amazing new construction locks rubber tubing between two braids of wire . . . makes recoupling quick and easy!
5. Cover is oil, grease, heat, sun and abrasion resistant!
6. Flexible and DURABLE . . . Your nearest BWH distributor will be glad to demonstrate the whip-like flexibility of Concord #20.

HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems. We're specialists in solving them. Consult The Happy Company, Tulsa, Oklahoma.

The HAPPY COMPANY
Formerly HAPPY BELTING COMPANY
TULSA, OKLAHOMA

BRANCH OFFICES

Seminole, Okla. — Pampa, Texas
Smackover, Ark. — Wichita Falls, Texas
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Ellinwood, Kan.

Industrial Hose — Rubber Belting — V-Belt Sheaves
V-Belts — Power Transmission Equipment

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS., U.S.A. • P.O. BOX 1671, BOSTON 3, MASS.

in Mechanical Drive Turbines

TYPE DP

For flexible speed control, performance accuracy, and on-the-job reliability, you can't beat a General Electric standard DP turbine with its totally-enclosed hydraulic governing system.

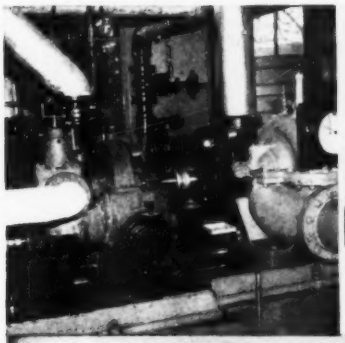
This pressure-relayed system gives you ease and accuracy of control that compares with the precision speed governing of large central station turbines. Yet the DP is a standard design, sold at standard prices.

YOU GET A WIDE SPEED RANGE— 30% adjustment for flexibility of operation. This feature, combined with the wide variety of ratings and speeds available, provides you with the "right" turbine for any job.

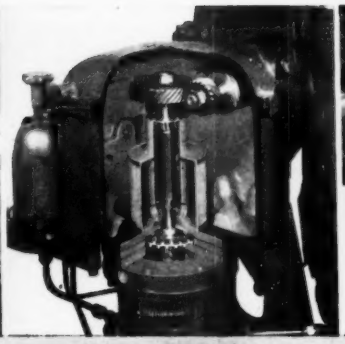
YOU GET PERFORMANCE ACCURACY— 6% regulation means holding the speed you want on important processes. Regulator control is available for governing in terms of any process requirement.

YOU GET GREATER RELIABILITY— the hydraulic governing system keeps moving parts to a minimum, operates in an oil atmosphere with no exposed linkages. This eliminates wear and corrosion, assures dependable operation.

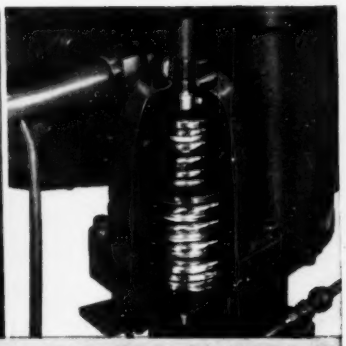
Check the features of the standard DP. It can give you the kind of precision performance you're looking for, the savings in operating costs that boost profits. Contact your nearest G-E sales office, or write for bulletin GEA-4955A. Apparatus Dept., General Electric Co., Schenectady 5, N. Y.



In this plant, a General Electric 30-hp DP turbine is coupled to a centrifugal pump. The hydraulic governing system provides accurate, reliable performance over a wide range of speed adjustment.

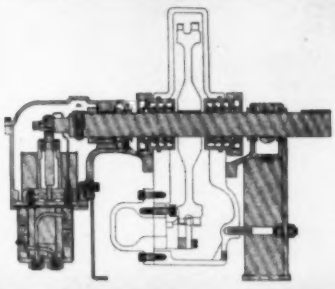


This turbine-type oil pump, gear driven from the main shaft, signals any tendency for the DP to speed up or slow down with changes in load. The pump also provides oil pressure for positioning the governor valve.



Acting on the speed signal from the oil pump, this pressure relay controls the amount of oil pressure in the operating cylinder. This cylinder regulates the amount of steam admitted to the turbine through the governing valve.

HYDRAULIC GOVERNING makes a difference



Here's What Standardization Provides For You

In the diagram at the left, all shaded parts are interchangeable on all sizes of DP turbines. Thus, it is easy to stock spares, and maintenance costs are reduced. All models have standard shaft height and coupling fits for easy installation or re-location in your plant. Standardization cuts manufacturing expense and the savings are passed on to you in the form of extra features usually found only on "special" turbines.

GENERAL ELECTRIC

252-44

Thermoid

Trioflex

Slim Hole Rotary Hose

For Portable Rigs, Seismograph and Work-over Service.

Every length Pre-Tested to 2000 psi before shipment.

Tube —Synthetic Rubber . . . abrasion and oil resistant.

Reinforcement —Braided Steel Wire for light weight, maximum strength and extreme flexibility. Stores in 36" coils.

Cover —Resists oil, grease, abrasion and weather . . . made of synthetic rubber for long life.

Couplings —male . . . factory assembled . . . Won't pull loose for life of hose.

It will pay you to *Specify* Thermoid!

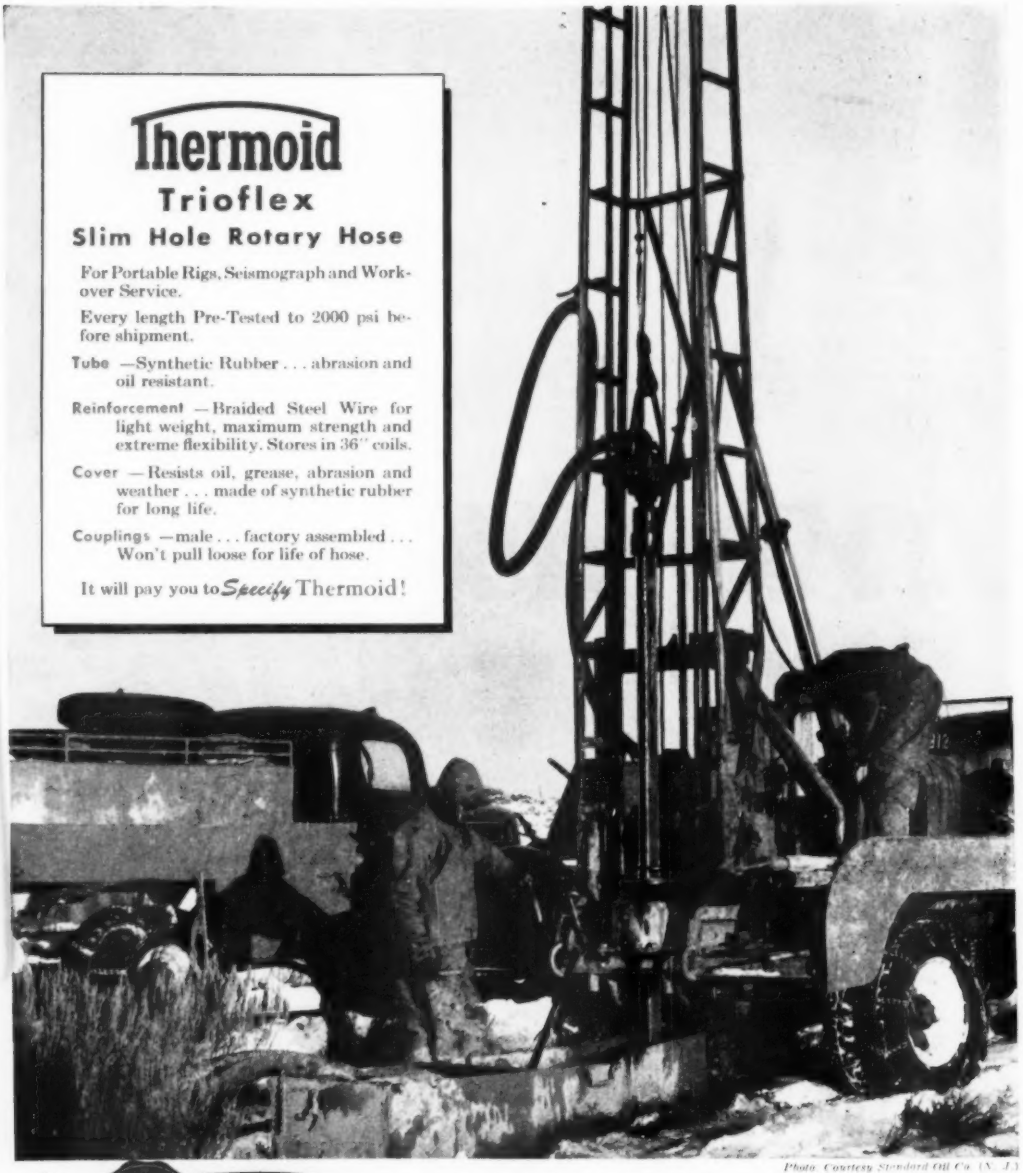


Photo Courtesy Standard Oil Co. (N. J.)

Also First Choice Thermoid Powerflex Rotary Hose

The recognized leader in the field. Every length pre-tested to 5000 psi before shipment.

Thermoid Quality Oil Field Products: Oil Country Flat Beltings• Wire Line Turn Backs• No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties• Powerflex Rotary Hose• Mud-Flo Slush Pump Hose• Flexible Discharge Units• Brake Blocks• F.H.P. and Multiple V-Belts.

SEE OUR CATALOG IN THE COMPOSITE CATALOG

Thermoid Company

Western Offices and Factory • Nephi, Utah, U.S.A.

Main Offices and Factory • Trenton, N. J., U. S. A.

Industrial Rubber Products • Friction Materials • Oil Field Products

THE FRONTIER REFINING CO.

DENVER, COLORADO

CHEYENNE, WYOMING

Chooses

REFINERY ENGINEERING COMPANY

to Design, Engineer and Build their new Cheyenne, Wyoming Cracking & Coking Units

This will consist of a 2-coil UOP Thermal Cracking Unit with integral coking facilities; a charging capacity of 2400 barrels and producing 105 tons of petroleum coke per day. The unit will also have a charging capacity of 3500 barrels, producing 1560 barrels of railroad fuel oil daily. Wyoming 19 gravity reduced crude will be used as charging stock. All hot oil lines, internal surfaces of vessels, pumps and other auxiliary equipment subject to corrosion will be fully alloy protected.

The Frontier Refining Company is taking the lead in the Rocky Mountain area in establishing a full-rounded schedule of operations. Starting date was December 1, 1949 and estimated completion date is late spring of 1950.

TRECo

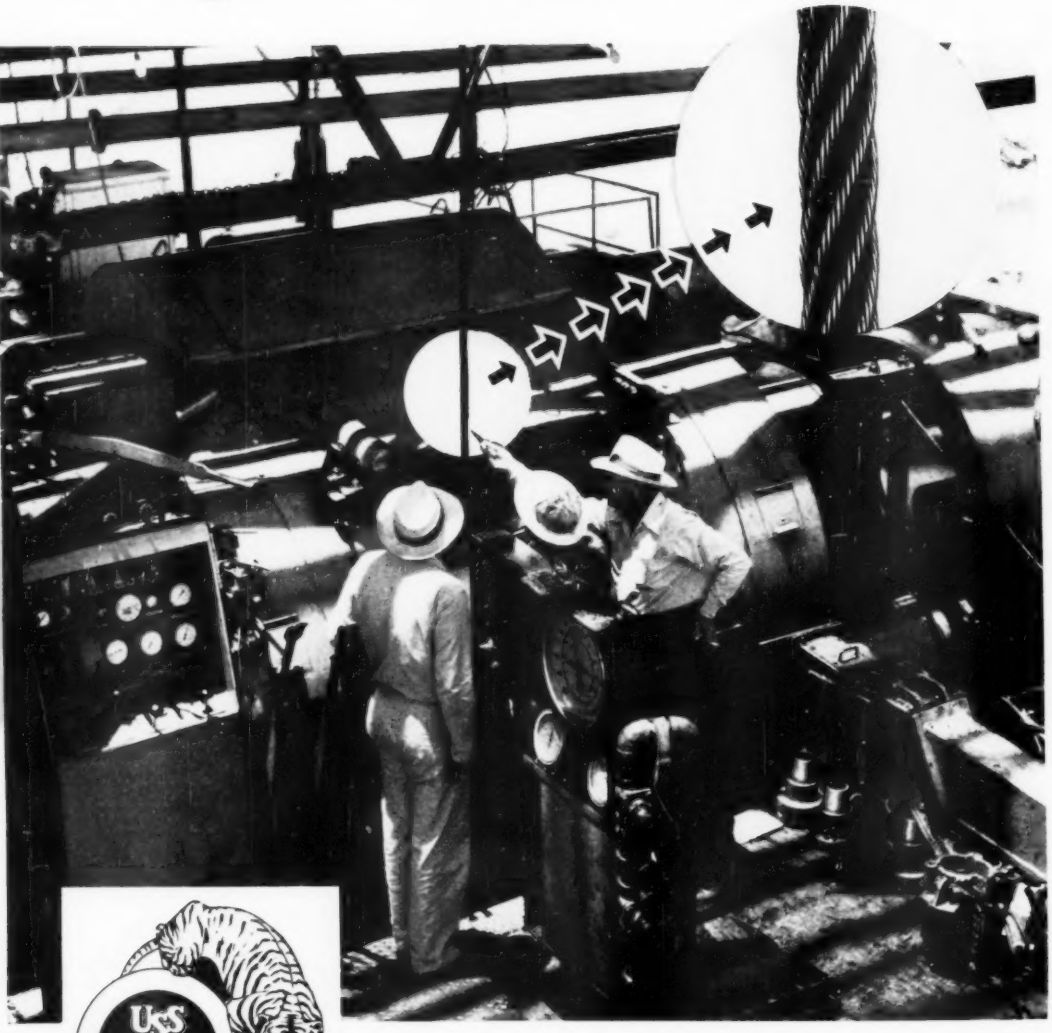
REFINERY ENGINEERING *Company*

PHONE 5-5561 • TULSA, OKLAHOMA

T

JUDGE IT BY THE JOBS IT HANDLES

Tiger Brand Wire Line



U·S·S American TIGER BRAND Wire Lines on the "Oilwell" Rig that broke all drilling speed records in the Benedum Field, Upton County, Texas.

helps set fast drilling record

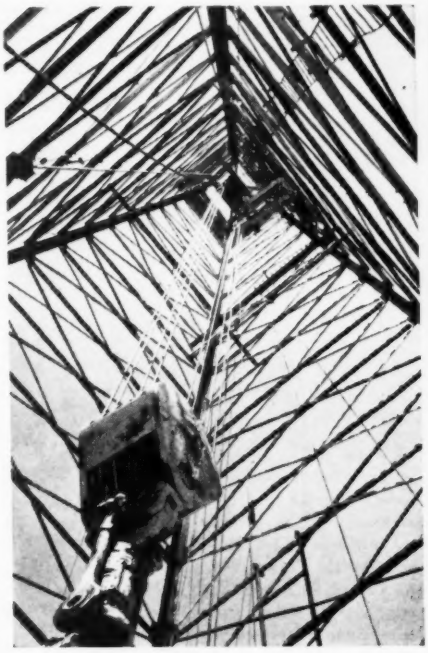
WHEN the fast drilling record was recently broken in West Texas, Tiger Brand Wire Line was on the job. The tool pusher claimed that Tiger Brand Lines gave the best service of any they had used.

The new record was set by the Helmerick and Payne crews on the Warren Wright-W. C. Chancellor No. 1 well. They drilled to 10,024 feet in 38 days and 3 hours — 19 days faster than the previous record.

The U·S·S American TIGER BRAND Wire Lines on the rig were 1¼" Monitor Excellay 6 x 19 with wire center. Only eight lines were strung in the blocks which speeded up round trips but put a greater strain on the line.

Drilling in West Texas is tough going with rock and chert all the way down. It means more round trips in and out of the hole, but that's where TIGER BRAND shows up best. It has the right combination of strength, abrasion resistance and flexibility to give maximum service life. On your next job specify TIGER BRAND.

Blocks were strung with only eight lines to obtain greater speed. This put more strain on the lines, but Tiger Brand has the surplus strength and fatigue resistance to take the extra strain.

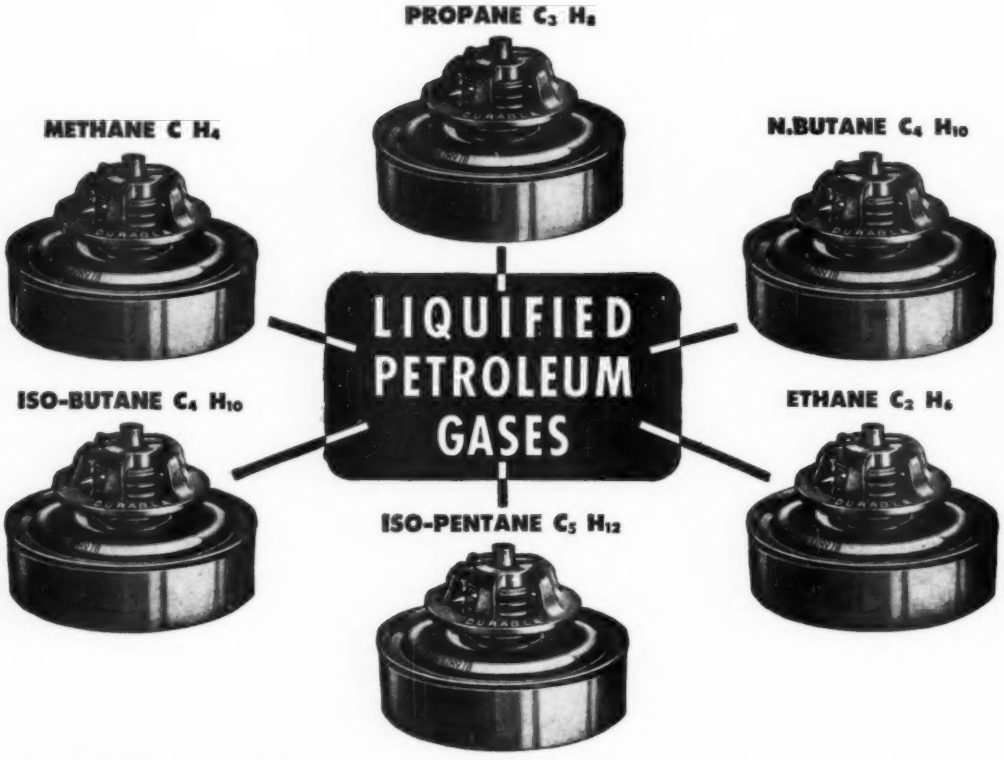


AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

AMERICAN TIGER BRAND WIRE LINES

Excellay Preformed

UNITED STATES STEEL



DURABLA PUMP VALVES FOR LIGHT HYDROCARBONS

When close clearance or any other design of reciprocating pumps are used for handling the greatly increased production of light hydrocarbons, DURABLA METAL PUMP VALVE UNITS* are your guarantee of high performance, freedom from "gassing" and replacement problems. The arched and curved shape of the valve member absolutely minimizes "slip", cavitation, and turbulence. DURABLA Valves are precision engineered, especially for this service.

Pump valves all open with a tilt action towards the flow line or line of least resistance. DURABLA Valves, being free-tilting, follow this natural law, which is not possible with high hub stem-guided valves or wing guided valves where large side friction is caused when they attempt to tilt in accordance with this basic law . . . and no other free tilting valve is as light as the DURABLA Valve.

ONLY DURABLA OFFER ALL THESE ESSENTIAL FEATURES FOR LIGHT HYDROCARBON SERVICE

- Feather Weight Valve Member
- Free-Tilting Valve Member Without Side Friction
- Snap Action Under Any Load
- Positive Seal Independent of Contraction and Expansion of Gases
- Does Not Need Lubrication
- Compact Design, Stocked in 11 Standard Sizes to Fit Any Pump

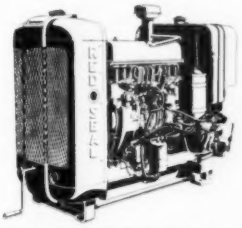
Write DURABLA Engineering Department for information and Bulletin, Reference **OG-2**

*Patent Numbers 2090486, 2117504

DURABLA MANUFACTURING COMPANY
114 LIBERTY ST. NEW YORK
BRANCHES IN PRINCIPAL CITIES. FOR CANADA REFER: CANADIAN DURABLA LIMITED, TORONTO

THIS TRADEMARK STANDS FOR DEPENDABLE OIL FIELD POWER

Continental Motors' broad line of engines and power units offers at least one model for almost every oil field and processing job—a model not only designed and built with the specific application in mind, but proved in actual on-the-job performance over the years. They range up to 170 h.p., and include models adaptable to use with various standard fuels. Continental builds prime movers suited to the needs of all but the very deepest drill rigs, and models for workover rigs, transfer pumps, mud pumps, winches, and auxiliary drilling equipment, as well as for standby use with generators, pumps and other processing equipment. No wonder you see it so often, not only in the oil field but wherever there's work to be done—the familiar Red Seal trademark that stands for dependable power, backed by a coast-to-coast network of service and parts.



HD-260 CUSHIONED POWER DIESEL INDUSTRIAL POWER UNIT

20 to 40 shaft h.p. for continuous duty; 25 to 45 shaft h.p. for intermittent duty.

Continental Motors Corporation

MUSKEGON, MICHIGAN

6218 CEDAR SPRINGS ROAD
DALLAS 9, TEXAS

3817 S. SANTA FE AVENUE
LOS ANGELES, CALIF.

BY INDUSTRY-WIDE REQUEST

FAMOUS "BCF" ALL-PURPOSE EXCHANGERS NOW PRODUCED IN

All-Stainless Steel

At low unit cost!

Your industry asked for it. So here it is ...the first fully standardized, all-stainless steel shell and tube exchanger ... identical in design and dimensions to its cupreous counterpart, the world-famed "BCF" ... and like it, mass produced!

ROSS

Serving home and industry

THE NEWS THAT BROKE JUST A FEW MONTHS AGO

. . . via this Ross ad in several business magazines. So great was the response that —

PRODUCTION HAD TO BE BOOSTED

. . . to keep current with orders. Result? Lower manufacturing costs — savings passed on to you.

SO, DOWN GO PRICES AS MUCH AS 22%

. . . on some sizes and from 10 to 22% on others.

$ $ SAVE $ $

Act now. If you haven't yet obtained information on the new Ross Type SSCF, do so at once by writing for Bulletin 1.7K1.

ROSS

FIRST WITH FULLY STANDARDIZED ALL-STAINLESS STEEL EXCHANGERS

ROSS HEATER & MFG. CO., INC., Division of American Radiator & Standard Sanitary Corporation 1417 West Ave., Buffalo 13, N. Y.

Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

How to choose Chemical Resisting Coatings

for INCREASED PROTECTION against Corrosion

This booklet can help you pick the UCILON† COATING SYSTEM that provides long-lasting protection against many corrosives causing coating problems!

Here's an easy, systematic method for selecting the right maintenance coatings for your job. Based on proved Ucilon Coating Systems, the following method will enable you to choose on the basis of service conditions — tell you at a glance which coatings can stand up on the job:

1. Consult this 32-page booklet. It lists 153 corrosive agents — including acids, alkalies, water, oils, salts, organic materials. Chances are the cause of your own problem is listed.

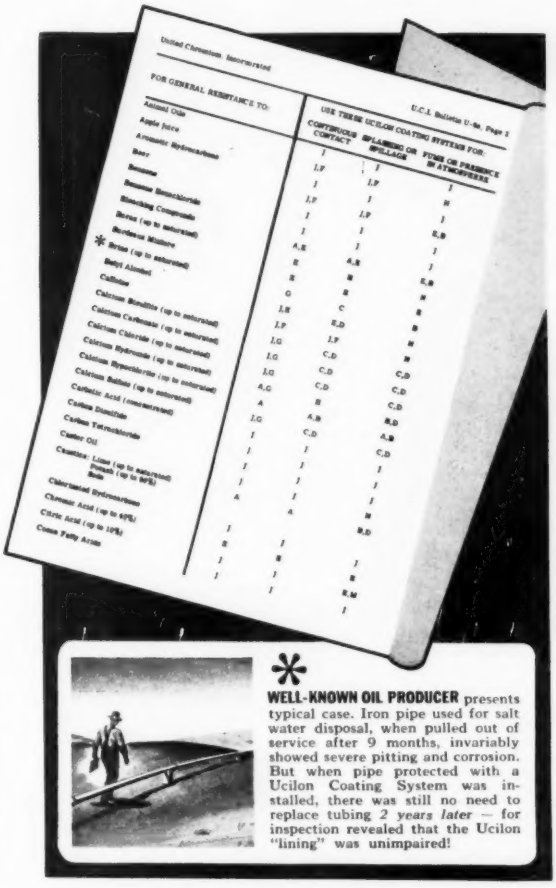
2. Read across and, depending on whether you want resistance to constant immersion and contact, or to splashing, or merely to vapors, pick out one of the recommended systems. By so doing, you automatically select the various Ucilon coatings which comprise that system.

3. Then look up the system denoted by the letters and apply the individual coatings according to clear, step-by-step instructions which follow.

A simple procedure — yet it has proved to be outstandingly successful. Users of these coating-systems have been reporting that they get not only better protection for plant and equipment but savings in painting costs as well!

Send for *your* copy of this booklet — first step in eliminating extra expense and maintenance headaches. And then see for yourself why Ucilon Coating Systems have proved to be the answer so often where other coatings failed.

† Trade Mark



* **WELL-KNOWN OIL PRODUCER** presents typical case. Iron pipe used for salt water disposal, when pulled out of service after 9 months, invariably showed severe pitting and corrosion. But when pipe protected with a Ucilon Coating System was installed, there was still no need to replace tubing *2 years later* — for inspection revealed that the Ucilon "lining" was unimpaired!

UCILON Protective Coatings

UNICHROME **Products of UNITED CHROMIUM, INCORPORATED**

51 East 42nd St., New York 17, N. Y. • Waterbury 90, Conn. • Detroit 20, Mich. • Chicago 4, Ill. • Los Angeles 13, Cal. • In Canada: Toronto, Ont

UNITED CHROMIUM, INCORPORATED, 51 East 42nd Street, N. Y. 17, N. Y.
Please send me your 32-page booklet on Ucilon Protective Coating Systems.

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

OJ3

Automatic, Reliable, Year 'Round Service ...Low Cost for Even the Small Producers

BS&B Glycol-Type GAS DEHYDRATOR

FREEZE-UPS need no longer menace your gas protection . . . Black, Sivalls & Bryson offers economical dehydration AT THE WELL-HEAD. Now you can provide adequate protection for gathering and transmission systems simultaneously . . . at low cost.

In a continuous automatic process, a dewpoint depression of 35° to 45° F. below ambient gas temperature is maintained by glycol desiccant. Unique design features by BS&B engineers provide highly efficient results for capacities as low as 1 or 2 million feet per day. And at smaller cost than that of most large plants!

Here are savings you can make . . . savings that cut costs, increase your profits, speed payout time • No gas lost blowing down frozen lines • No labor cost opening frozen lines • No lost production from shut-in wells • Better, more accurate measurements. Eliminates heaters and other expensive pipeline construction features • Aids in the recovery of natural gasoline ordinarily blown to atmosphere from pipeline drips while removing accumulated water.

BS&B's smallest standard Dehydrator unit is rated at 2 million feet daily capacity at 500 psi working pressure. Other models are available for other capacities and pressures. Long testing has shown that BS&B Dehydrator operating costs are most nominal . . . 0.1 pint desiccant lost, power and fuel consumption approximately 3,000 feet, PER MILLION feet of gas treated. Dehydrated power and fuel gas for the unit is obtained from the Dehydrator outlet.

See your nearest BS&B Sales Engineer today, or fill in coupon for complete details.

BS&B

Oil Field Equipment Division, Dept. GLD-21
BLACK, SIVALLS & BRYSON, INC.
720 Delaware, Kansas City 6, Mo.

Send me complete information and literature about the NEW BS&B DEHYDRATOR. Have a Sales Engineer call on me.

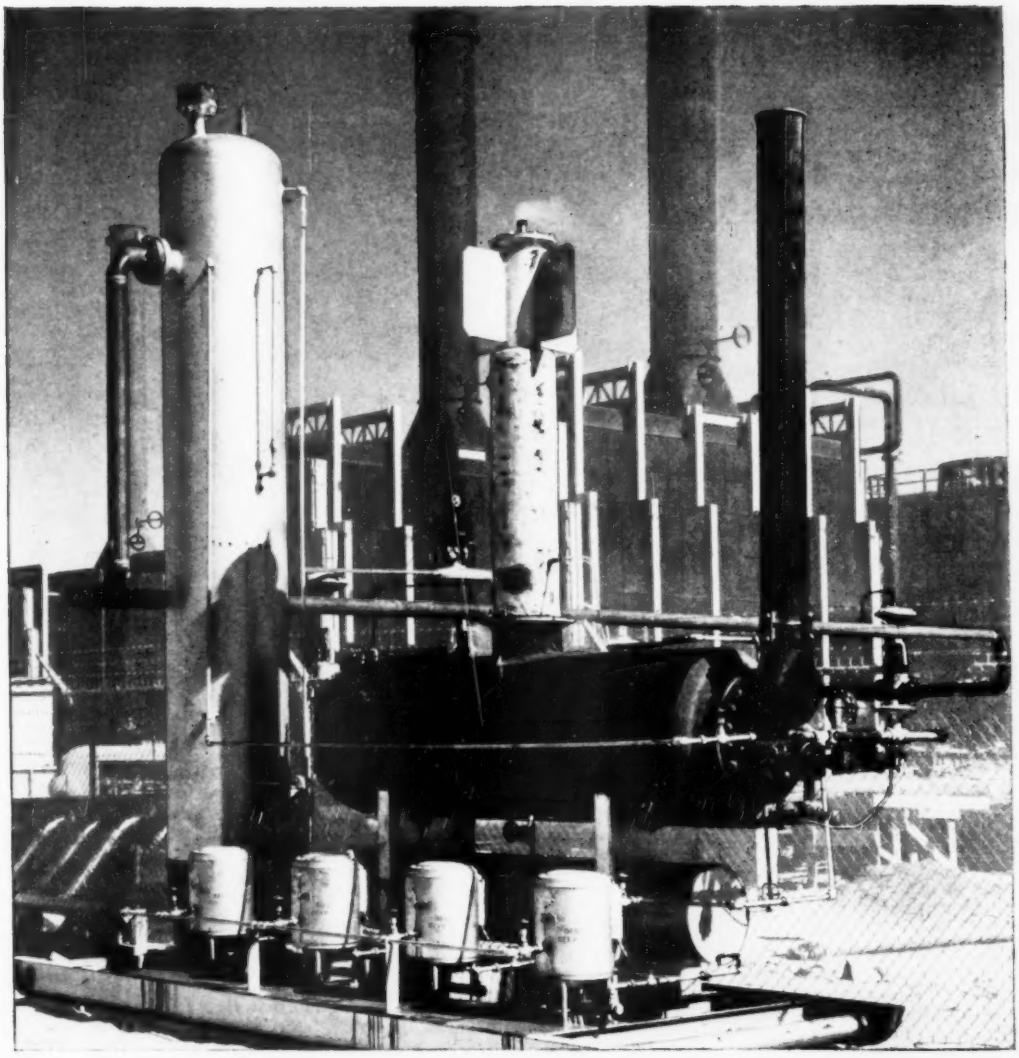
NAME

ADDRESS

CITY ZONE STATE

END

Through



Glycol-type Dehydrator, Benedum Field, near Rankin, Texas. Texas National Gasoline Plant.

the Water at the Well-head...

FREEZE-UPS

out Your Entire System!

CUTTING COSTS ACROSS THE COMITE...

Another Republic Electric Weld Pipe Line 50 miles long

Right: 12" Republic Electric Weld Line Pipe with river clamps installed.

Below: Comite River crossing in Louisiana.

● Builders of this 12" pipe line, constructed in 1946 between Liberty, Mississippi, and Baton Rouge, Louisiana, lost little time in crossing Louisiana's Comite River. Here again, Republic Electric Weld Line Pipe proved that its ease of bending and welding, its uniform wall thickness and roundness, its uniform straightness and long lengths sharply cut installation time and costs.

Yes, these six of its ten outstanding qualities can help solve your installation problems . . . and the combination of all ten, listed at right, means trouble-free line performance throughout a dependable long life.

During the past twenty-one years, more than 55,000 miles of Republic Electric Weld Line Pipe has been placed in service carrying crudes, gasoline, natural gas and by-products.

1. **Uniform Roundness**—Pipe ends match perfectly . . . speed construction . . . cut costs.
2. **Uniform Diameter**—No "off-size" lengths to cause welding difficulties at joints.
3. **Uniform Wall Thickness**—Absolute dependability throughout every inch of length and circumference.
4. **Uniform High Yield Strength**—Permits building higher pressure lines—utilizing design values to fullest advantage.
5. **Uniformly Straight**—Lengths line up evenly . . . go into the ditch freely.
6. **Easy to Bend**—High ductility steel makes bending in the field easy.
7. **Easy to Weld**—Low carbon steel welds readily . . . makes sound joints.
8. **Freedom From Scale**—Insures against clogged valves, contamination of petroleum products.
9. **Long Lengths**—Reduces number of joints . . . makes jobs move with longer strides.
10. **Inspected Inside and Out**—Republic Electric Weld Line Pipe is made from flat-rolled steel both sides of which are closely inspected. Thus, you are assured that the surface which becomes the inside wall when formed into pipe is free from hidden defects.

Write for descriptive literature.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Dept.: Chrysler Bldg., New York 17, N.Y.

Republic

REPUBLIC STEEL

ELECTRIC WELD LINE PIPE

Other Republic Products include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

one of these ALDRICH PUMPS WILL meet your requirements

Here's the Aldrich "Big 3" in Pumps for the Petroleum Industry. All three were designed and built for pipe line, oil field and refinery service. One of the three should "just fit" your purpose.

The ALDRICH-GROFF "POWR-SAVR", above right, is a constant speed, variable stroke, variable capacity pump. It handles any free flowing liquid—can be automatically or manually controlled to provide stepless, straight-line variation from zero to rated maximum output. Adjustable pressures up to 15,000 psi can be maintained and variance will not exceed 2% to 5% of that desired. Power consumed is practically proportional to delivery.

The ALDRICH Inverted Vertical Quintuplex Pump, above center, can be equipped with built-in gearing (except in greater HP ratings) or with direct coupling to prime mover. This pump is ideal for use wherever large volumes of liquid must be moved against medium or high pressures.

The ALDRICH Inverted Vertical Triplex, below left, is a high pressure, constant stroke, constant speed pump. Drive arrangements can be made through gear-head motor, built-in pump gearing from extended pinion shaft, or chain, flat or V belt from extended crankshaft. Pressures up to 8350 psi can be easily maintained.

Write for complete information.

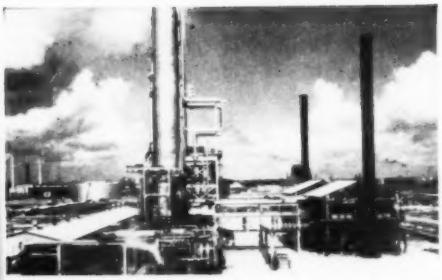
ALDRICH

THE ALDRICH PUMP COMPANY

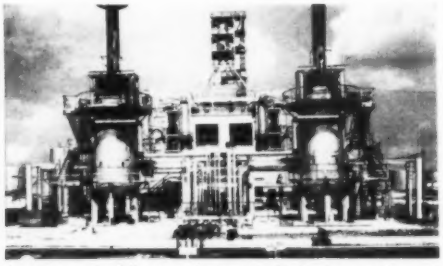
9 GORDON STREET, ALLENTOWN, PA.

Representatives: Birmingham • Bolivar, N. Y. • Boston • Chicago • Cincinnati Cleveland • Denver • Detroit • Duluth • Houston • Jacksonville • Los Angeles New York • Omaha • Philadelphia • Pittsburgh • Portland, Ore. • Richmond, Va. St. Louis • San Francisco • Seattle • Spokane, Wash. • Syracuse • Tulsa

Cit-Con widens Lube-Oil horizons

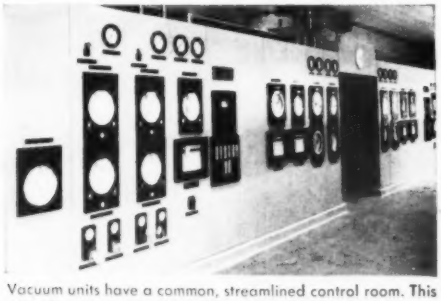


Cit-Con's "twin" vacuum distillation units shown here can each handle 12,500 barrels a day of reduced crude. Design provides over-capacity to produce a higher proportion of neutral oils to bright stock when required.



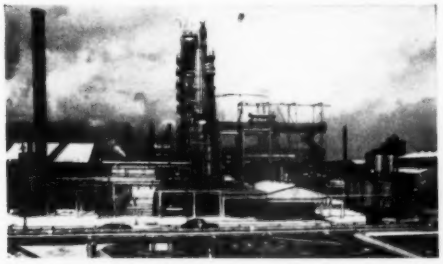
Lummus vertical heaters distinguish Cit-Con's two identical clay contact plants. One handles light distillates; and the other, heavy distillates and bright stocks.

The new Cit-Con lubricating oil plant at Lake Charles, La., is an outstanding example of Lummus' design and construction. From the beginning, the project kept pace with pre-planned schedules. Currently, operations and products are meeting the most modern standards.



Vacuum units have a common, streamlined control room. This view shows instrument board and instruments for both of the distillation units.

This air view shows the L-shaped layout of the processing units. From right to center foreground can be seen, in order: vacuum distillation units, solvent refining units, and the boiler house in the corner. Continuing to the left around the L are the two MEK dewaxing units, the clay contact plant, and the wax finishing unit.



The furfural extraction unit is of exceptionally high capacity with two stages of furfural recovery on the raffinate system and four stages on the extract system. The solvent circulation rate is 30,000 barrels daily.

This general view shows in close-up, from left to right, MEK dewaxing units No. 1 and 2, and the clay contact plant. The No. 1 MEK plant for light distillates has recrystallization facilities which may be equipped later for incremental dilution. The other plant for heavy intermediate distillate and bright stock is presently equipped with repulping facilities to reduce oil content of the amorphous type wax.

THE LUMMUS COMPANY
420 Lexington Avenue, New York 17, N. Y.

LUMMUS

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HOUSTON — Mellie Esperson Bldg., Houston 2, Texas
The Lummus Company, Ltd.
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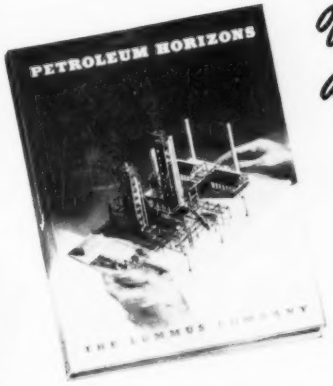
reserve your copy
of this 1950 data book?



PETROLEUM HORIZONS, the new 80-page book on Lummus processes and plants, features a step-by-step description and flow sheets for 31 refinery processes. It brings you complete details on the background, organization and world-wide services of the Lummus Company.

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420 Lexington Avenue
New York 17, N. Y.

Please reserve for me a copy of PETROLEUM HORIZONS.

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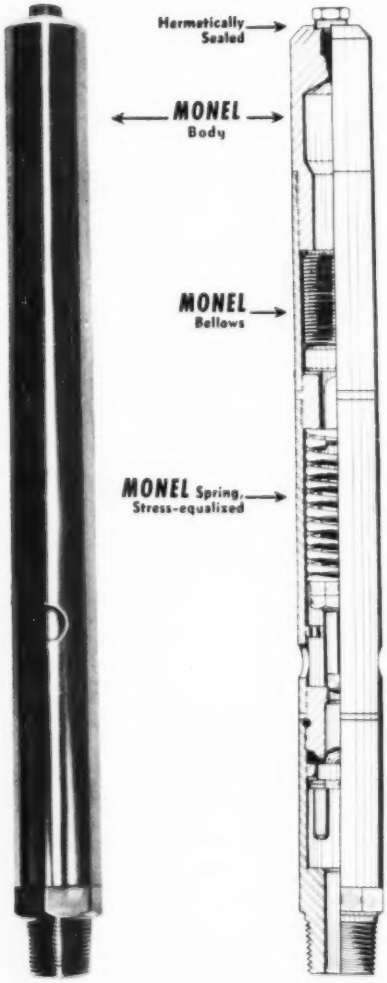
Made of corrosion-resistant MONEL, the CAMCO *"Slugger" is designed for*

Economical Gas Lift in Low Pressure Wells



BELLOWS-PRESSURE, MONEL-SPRING OPERATED Type D Flow Valve for use in open and closed well installations requiring selective intermittent flow. *Illustrations and data courtesy of Camco, Inc., Houston, Texas.*

The Camco Type D "Slugger" is designed for low permeable producing reservoirs utilizing low pressure gas.

The use of Monel® in this valve is important. For Monel—like all high nickel alloys—combines strength and toughness with an exceptional degree of resistance to corrosion, abrasion and wear.

Monel withstands severe stresses and shocks. It helps provide you with a valve that does not bleed off its bellows charge in the hole. It helps give you a valve with stem and seat that hold. And one that resists the corrosive action of hydrogen sulfide, salt water, and dilute concentrations of hydrochloric acid.

Monel, in short, stands up where other materials *give up.* And this includes even the sour gas areas of West Texas and New Mexico.

For complete information about the many special features and advantages of the Type D Flow Valve, write CAMCO, INCORPORATED, 1108 Scanlan Building, Houston 2, Texas. They'll be glad to send you the full story that tells how the Type D works in low-fluid-level wells.

P. S. When you run into problems involving metals for oil field use, write us. INCO's Technical Service has lots of valuable data handy, welcomes the opportunity to share it with you. Get their impartial suggestions and recommendations without cost or obligation.

THE INTERNATIONAL NICKEL COMPANY, INC.

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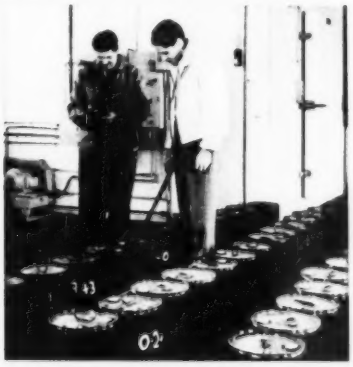
EMBLEM OF SERVICE

INCO

MONEL® ...YOUR PARTNER IN PROGRESS

Cars used for testing are current models typical of the great majority on the road as well as others equipped with high compression ratio research engines.



Experimental fuels, stored under refrigerated conditions to maintain uniformity of volatility, are carefully checked before road testing.

DU PONT

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

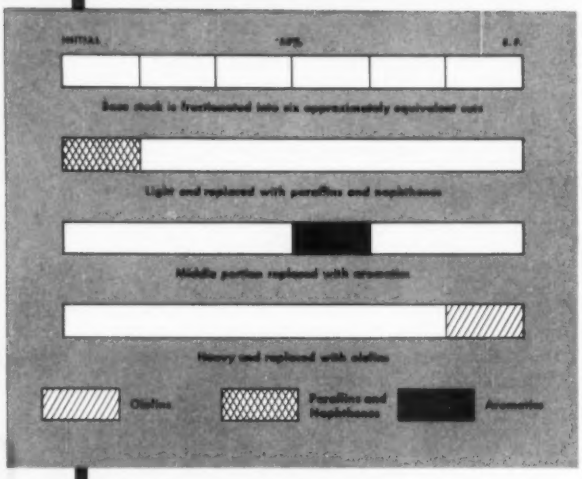
DU PONT
TETRAETHYL
LEAD
COMPOUNDS

Du Pont Research

Studying the Effects of Fuel Hydrocarbon Types on Road Antiknock Performance

As a service to the refining industry, Du Pont is now engaged in a program of fuel research designed to help provide answers to such questions as: how should fuel blending stocks rich in aromatics, naphthenes or other hydrocarbon types be blended to provide optimum fuel performance—where and how should they be blended to make most efficient use of tetraethyl lead compounds. This research project is devoted to studying the effects of fuel hydrocarbon types on road antiknock performance and is one of the most extensive of its type ever undertaken. Work on this study is now in progress and results will be available in the near future to assist refiners in their gasoline production.

Du Pont, as a supplier of tetraethyl lead compounds to a constantly increasing number of refiners, is working with the refining industry toward the common goal of improved gasolines for the motoring public at the lowest possible cost. Du Pont Petroleum Chemicals research is aimed at improving antiknock compounds and helping the refiner utilize present tetraethyl lead compounds most efficiently.



EXAMPLES OF HOW DIFFERENT HYDROCARBON TYPES ARE BLENDED TO PRODUCE EXPERIMENTAL FUELS

Working to help the refiner blend for the best possible utilization of TEL

As a starting point in the present Du Pont study of the effects of fuel hydrocarbon types on road antiknock performance a good quality regular grade gasoline was fractionated into six approximately equivalent cuts. Then each fraction was replaced systematically with pure hydrocarbons of three types (1) olefins, (2) paraffins and naphthenes and (3) aromatics (where possible). The components used in making these blends were selected so that the volatility of the finished blends was changed as little as possible and the research octane numbers of the unleaded blends were constant within plus or minus five units. The resulting blends, both clear and containing various amounts of TEL are being road knock tested in current model cars typical of the great majority on the road as well as in cars equipped with high compression ratio research engines. Thus data are being obtained on both present day and future requirements.

Such information will provide a better understanding of: (1) the effect on road antiknock performance and lead response of gasoline hydrocarbon type and position in the fuel boiling range and (2) the effects of engine design and compression ratio on the relative performance of basically different fuels. This project has a very practical value to the refiner because it will give him leads as to how he can best blend his stocks and make the best possible utilization of tetraethyl lead.

DU PONT
REG. U.S. PAT. OFF.

MAKE DU PONT THE SOURCE FOR ALL OF YOUR GASOLINE ADDITIVES...

- **TETRAETHYL LEAD COMPOUNDS** *(Motor Mix—Aviation Mix)*
- **ANTIOXIDANTS**
- **METAL DEACTIVATOR**
- **DYES**

BETTER THINGS FOR BETTER LIVING...*Through Chemistry*

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A-9596

Now! a FASTER·EASIER·SAFER way to handle pipe

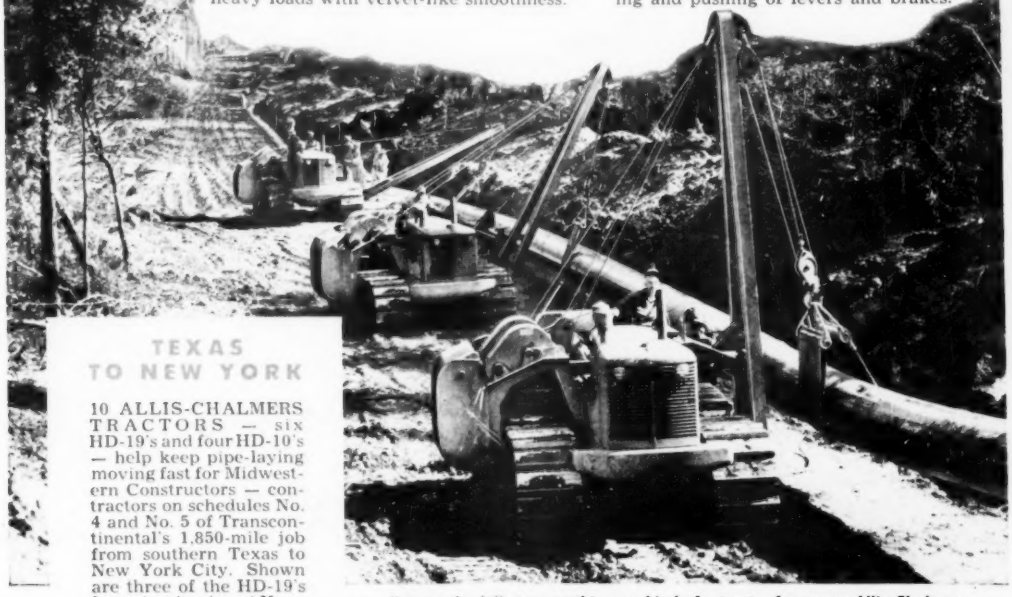
WORLD'S LARGEST TRACTOR— Allis-Chalmers HD-19 with Hydraulic Torque Converter Drive — Brings You a New Kind of Performance On All Phases of Pipe-line Work.

GREAT LIFTING CAPACITY A big, powerful tractor with 40,000 lbs. of properly balanced weight, the HD-19 easily handles the largest, heaviest pipe. With boom low, it can lower-in pipe from a position of 10 to 12 feet from edge of trench . . . thus prevents cave-ins. Also, torque converter drive assures smooth, easy, safe lowering — no sudden jerking or jarring.

UNUSUAL FLOTATION ABILITY Creeps along over soft going...doesn't dig itself in or get hung up on stumps. Has unusual high clearance and long, 28-inch, extra wide, sure-gripping tracks . . . plus the torque multiplying characteristics of the torque converter that permit you to move heavy loads with velvet-like smoothness.

OUTPERFORMS IN ANY GOING Easily pulls heavy equipment — like bending machines — up steep grades and through soft going. The torque converter drive automatically synchronizes HD-19's speed with the equipment being pulled or pushed — no shifting. An important advantage when working with cleaning and priming or doping and wrapping machines!

OUTMANEUVERS Shifting is practically eliminated — only two forward gear ratios — 0 to 3 and 0 to 7 m.p.h. Operator just "guns" the throttle when pipe is lowered-in, gets in front of other tractors in a hurry and quickly maneuvers into position. Steering is hydraulic . . . braking is self-energizing — no tiresome pulling and pushing of levers and brakes.



TEXAS TO NEW YORK

10 ALLIS-CHALMERS TRACTORS — six HD-19's and four HD-10's — help keep pipe-laying moving fast for Midwestern Constructors — contractors on schedules No. 4 and No. 5 of Transcontinental's 1,850-mile job from southern Texas to New York City. Shown are three of the HD-19's lowering-in pipe at Newnan, Georgia.

But get the full story on this new kind of a tractor from your Allis-Chalmers dealer. Let him give you a demonstration. "Seeing Is Believing."

ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE 1, U. S. A.

There's a right size A-C tractor for every need

Model	Horsepower	Weight (bare)
HD-19	163.00 on flywheel	40,000 lbs.
HD-10	86.63 drawbar	21,000 lbs.
HD-7	60.10 drawbar	13,830 lbs.
HD-5	40.26 drawbar	10,500 lbs.

Originator of the Torque Converter Tractor

Here's the *NEW* "Oilwell" No. 218-P Power Slush Pump

...designed for 450 H.P. input at 60 R.P.M. yet weighs less than 70 lbs. per H.P.

TWO NEW FEATURES

Lighter weight. The new No. 218-P Pump weighs only 31,000 pounds which brings the weight per horsepower to less than 70 pounds.

Greater rigidity. In spite of the lighter weight, rigidity has been increased by the use of a new power frame design in which the frame casting entirely encompasses working parts. (See illustration.)

YOU SAVE MONEY

The No. 218-P POWER SLUSH PUMP has been added to the "Oilwell" line to meet drilling conditions which do not require the full big-volume, high-pressure, mud-circulating capacities of "Oilwell's" No. 220-P Pump—affording operators a corresponding saving in initial investment.

New in design and construction, the No. 218-P presents . . . besides many distinct advantages . . . the same efficient, trouble-free performance and low operating costs common to all "Oilwell" power slush pumps.

For complete information stop at the "Oilwell" store near you or write for Booklet No. 10-49.

See "Oilwell's" newest movie "GEARS . . . and OIL." Available for immediate bookings in your vicinity. Ask your nearest "Oilwell" representative.

BRIEF SPECIFICATIONS

SIZE (Bore and Stroke)	inches	7¼ x 18
LINER SIZES (DI-HARD)	inches	5, 6, 6½, 6¾, 7, 7¼
HYDROSTATIC TEST PRESSURE: Discharge	p.s.i.	6,000
Suction	p.s.i.	3,000
RATED WORKING PRESSURE: Discharge	p.s.i.	3,000
Suction	p.s.i.	2,000
RATED B.H.P. AT 60 R.P.M.		450
MAXIMUM WORKING PRESSURE WITH FULL SIZE LINERS	p.s.i.	890
GEAR RATIO		4.95:1
PINION SHAFT EXTENSION: Diameter by Length	inches	5.995 x 17
Keyway Width and Depth	inches	1½ x ½
FLUID SUCTION CONNECTION (10" x 17½" Se. 300 Companion Flange) PIPE SIZE		10"
FLUID DISCHARGE CONNECTION: Air Chamber (4" x 10¾" Series 600 Companion Flange) PIPE SIZE		4"
OIL CAPACITY	gallons	48
WEIGHT (Mounted on Short Structural Steel Skid Base)		
Domestic	pounds	31,000
Export	pounds	31,800

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USS "OILWELL"

UNITED STATES STEEL

Free Yourself

from Constant Repair and Replacement Troubles with the

Chapman

LIST 960

...the long lasting Gate Valve!

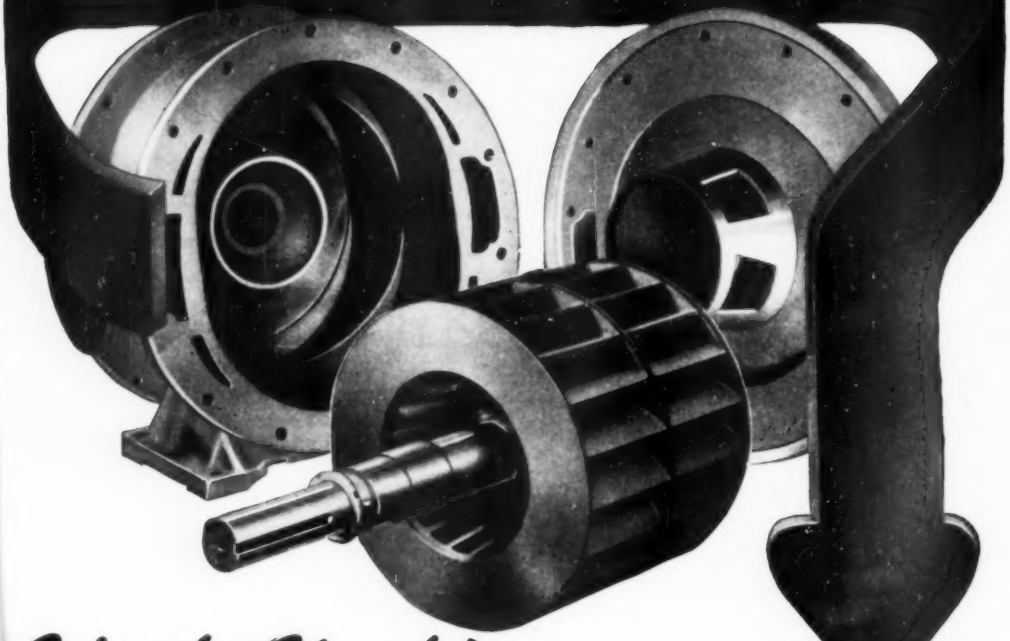
Unlike ordinary valves, the Chapman 960 is extra-sturdy to give you longer trouble-free service. And here's why —

1. Body and yoke are made of tougher forged steel.
2. A flanged, forged-steel packing gland protects threads on valve yoke from rust and corrosion.
3. No gaskets to blow.
4. Repack it under full pressure — no pressure transmitted to valve stem.
5. Newly designed stem and wedge gate connection gives 50% increase in strength at points where extreme stress can develop.
6. Malcomized stainless steel seat rings and wedge faces ensure maximum wear resistance.

So for your best buy specify the Chapman List 960. Available in sizes from ¼" to 2" — carbon steel for pressure range 2000 pounds at 100° F., 380 pounds at 1000° F. For higher pressures, specify List 990.

The Chapman Valve Manufacturing Company
INDIAN ORCHARD, MASSACHUSETTS

This Simple Compressor Meets the Complex Needs of a Changing Petroleum Industry



It's the Nash!

Here is a compressor presenting advantages found in no other device. Nash Compressors have only one moving part, rotating without metallic contact with the pump casing. No internal lubrication is required. Yet they produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure.

There are no valves, gears, pistons, sliding vanes, or other complicated wearing parts in a Nash. Compression is secured by an entirely different principle of operation. Because of this, gas pumping problems difficult with ordinary pumps are often easily handled by the Nash. For example, Nash Pumps are standard equipment in the Synthetic Rubber Industry, where they have met the needs of new and difficult processes.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. They maintain original performance over long periods. Service is assured by a nationwide net-work of Engineering Service offices. Instructive bulletin shows how they operate. Write for it.

One moving part.

No internal wearing parts.

No valves, pistons, or sliding vanes.

No internal lubrication.

Low maintenance.

Slugs of liquid entering pump do no harm.

Non-pulsating pressure.

Saves floor space

75 pounds in a single stage.

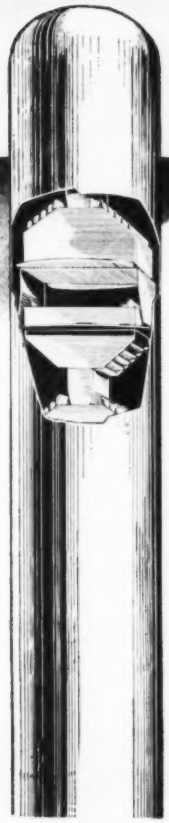
NASH ENGINEERING COMPANY

273 WILSON, SO. NORWALK, CONN.

a new

HIGH

in liquid-liquid contacting with
KOCH KASKADE fractionating trays



The Koch Kaskade tray has set new records for efficiency, capacity and economy in liquid-liquid contacting.

Stage efficiencies up to 75%.
Capacities four times as great as in a packed column.
Better contacting without emulsification and carryover.

Koch Kaskade trays will solve your liquid-liquid extraction problems with highest efficiency and lowest cost.

For further information, write us for Bulletin **O-101** and additional data on liquid-liquid extraction — no obligation.

THE KOCH ENGINEERING COMPANY, INC.

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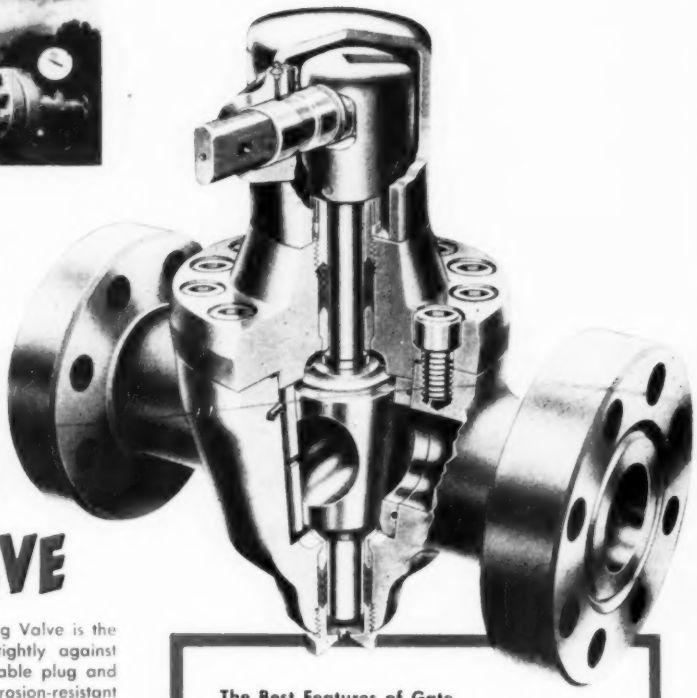
BRITISH ASSOCIATES
MESSRS. A. F. CRAIG & CO., LTD.
PAISLEY, SCOTLAND

The *All-Cameron* CHRISTMAS TREE

featuring the new

Cameron NON-LUBRICATED LIFT-PLUG VALVE



The new Cameron Non-Lubricated "LP" Lift-Plug Valve is the ultimate in Christmas tree valves. It seals tightly against heavy crude or light hydrocarbons. Its renewable plug and separate seat are furnished in any desired corrosion-resistant alloy. The valve is exceptionally easy to operate, even against extremely high well pressures. It requires no attention because it is non-lubricated. If and when this valve needs repairs, no special skill or tools are required to completely overhaul it in the field without removing it from the tree.

The Cameron "LP" Valve, like other Cameron Christmas tree units, is forged steel, which makes available to the industry for the first time an all-forged steel, all-Cameron tree . . . with the further advantage of undivided responsibility.

The Best Features of Gate, Plug, and Globe Valves Combined With Exclusive Cameron Innovations

NON-LUBRICATED — No grease required to effect seal; reduces chance for human error and eliminates lubrication maintenance cost. ***PRESSURE-SEALING***—Line pressure forces seat into sealing engagement with plug. ***UNIQUE LIFT-PLUG ACTUATOR***—Lifts, turns, and reseats plug in continuous turn of a lever. ***RENEWABLE SEAT AND PLUG***—Corrosion Resistant—easily replaced when damaged; permits any desired trim. ***FIELD REPAIR***—Can be completely overhauled without removal from line; no special tools or skill required. ***EASY OPERATION***—Requires less operating effort than other valve designs. ***FORGED STEEL*** — All parts, including body, are press or drop forged from specification materials.

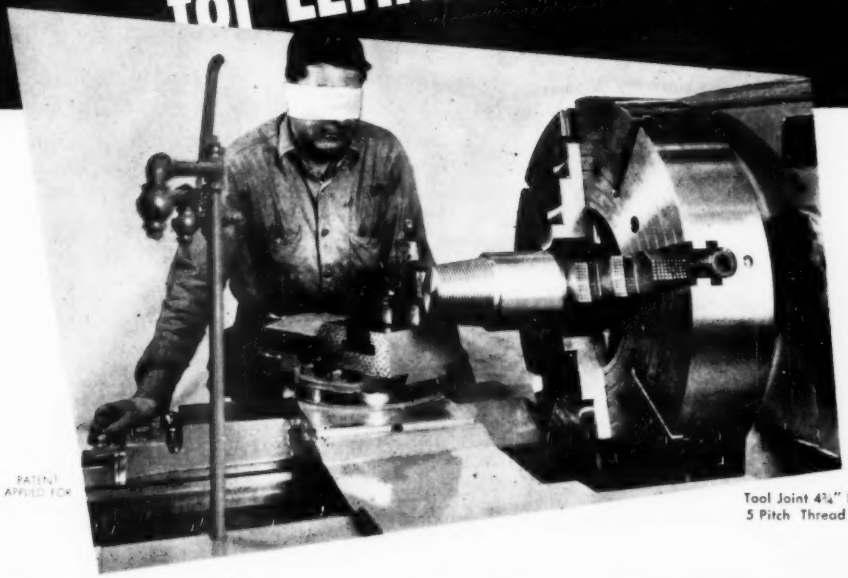
Cameron

IRON WORKS, INC.

P. O. BOX 1212 HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y.

SENSATIONAL New Threading Attachment for LEHMANN LATHES!



PATENT APPLIED FOR

Tool Joint 4¾" Diameter, 5 Pitch Thread 4" Long

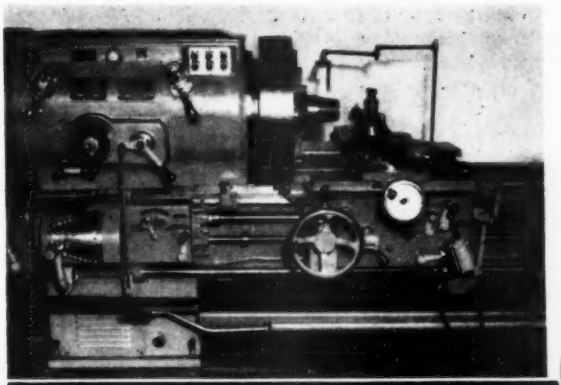
Blindfolded, Inexperienced Operator Threads 4" Oil Field Tool Joint to A.P.I. Standards, *in 15 minutes!*...

Yes, this amazing new Threading Attachment for LEHMANN LATHES will definitely reduce your threading time. It will disengage and stop tool at the same place, no matter what the speed, and close to a shoulder without thread relief and with perfect safety.

The LEHMANN Threading Attachment automatically and simultaneously disengages half nuts, and backs out tool on contact with automatic stop. It can be set for external or internal threads, for right hand or left hand threads, and for straight or tapered threads. In short, it enables an inexperienced operator to equal the speed of an expert.

Write Today for Prices and Full Description

• • •



25-inch HYDRATROL Oil Field Lathe with LEHMANN Threading Attachment.

CHOUTEAU AT GRAND • ST. LOUIS 3, MO.

LEHMANN MACHINE COMPANY

It's EASY to install "Payroll Savings"

If you've put off installing the Payroll Savings Plan in your company because you feel it would be "a lot of work," then this advertisement is certainly for you! Because it's really *very simple* to give your employees the advantages of investing in U. S. Savings Bonds the easy, automatic "Payroll" way.

. . . and 20,000 companies' experience proves it pays!

HERE'S ALL YOU NEED TO DO

Appoint one of your top executives as Savings Bond Officer. Tell him to get in touch with your State Director, Savings Bonds Division, U. S. Treasury Department. Here's what happens . . .

The State Director will provide application cards for your employees to sign—plus as much promotional material and personal help as necessary to get the Plan rolling in your company.

Those employees who want Savings Bonds indicate on the applications: how much to save from their pay; what denomination of Bonds they want; and the inscription information to appear on the Bonds.

Your payroll department arranges to withhold the specified amounts, arranges to get the Bonds, and delivers them to the employees with their pay.

The Bonds may be obtained from almost any local bank or from the Federal Reserve Bank or may be issued by the company itself upon proper certification by the Federal Reserve Bank or Branch in the company's District.

THAT'S ALL THERE IS TO IT!

In case you're skeptical as to how many of your employees would like to have Payroll Savings, canvass your plant—and be prepared for a surprise. (Remember that pay-check withholdings for Bonds are *not* a "deduction"—the employee takes home his Bonds with his pay.) One leading manufacturer, who had professed little faith in the Plan, found his eyes opened when he asked the people in his plant whether they would like to obtain Bonds in this way. Within only six months after he installed the Plan, half his employees signed up. A prominent aircraft manufacturer, whose company had used the Plan for some time, was not aware of its potentialities until his personal sponsorship increased participation by 500% among his company's employees.

THE BENEFITS ARE BIG—FOR EVERYONE

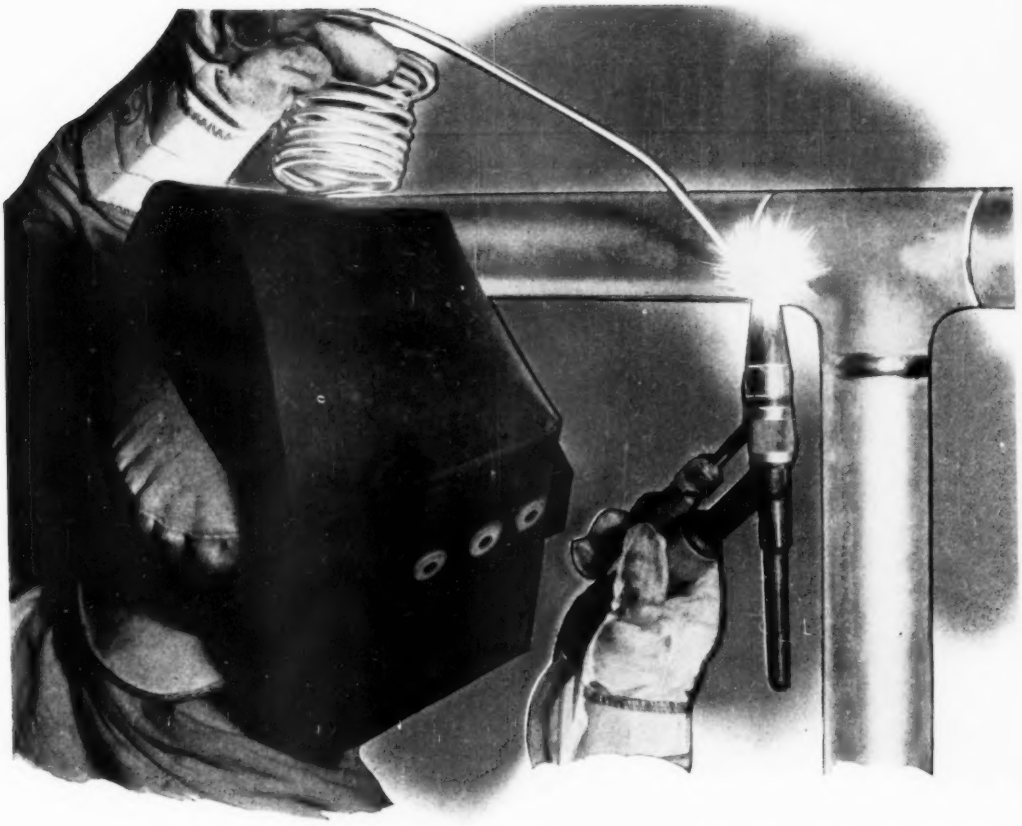
The individual employees gain security—they know that the Bonds they hold will return $4 for every $3 at maturity. The company gains from the resultant increased stability and efficiency of its workers. The whole nation gains because Bond sales help stabilize our economy by spreading the national debt and by creating a huge backlog of purchasing power to boost business in the years ahead.

Is it *good policy* to deprive your company of Payroll Savings—even one more pay day? Better at least have a talk with your U. S. Savings Bonds State Director, get the answers to your questions, and *know for sure.*

The Treasury Department acknowledges with appreciation the publication of this message by

THE OIL AND GAS JOURNAL
Tulsa 1, Oklahoma

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.



Corrosion-Resistant Pipe at Half the Cost

ALCOA ALUMINUM PIPE COSTS LESS, INSTALLS FASTER

Want to save up to 50% on corrosion-resistant pipe? Specify Alcoa Aluminum Pipe—lowest-cost corrosion-resistant pipe you can buy. Highly resistant to attack by sulfur compounds—safely carries many chemicals, petroleum products, foods, commodities. Protects product purity—is often used where maintenance of color is essential. Weighs only one third as much as ordinary metal pipe. Easy to install using familiar methods and with standard fittings and flanges available from nationally-known manufacturers.

Alcoa Aluminum 63S Pipe is seamless, and comes in $\frac{1}{8}$ inch to 12-inch standard pipe sizes. For your nearest supplier who will give you helpful information on welding, threading, etc., call your local Alcoa sales office, or write ALUMINUM COMPANY OF AMERICA, 1978B Gulf Bldg., Pittsburgh 19, Pa.

For local source of supply on Alcoa Aluminum Pipe and other Alcoa products, look under "Aluminum" in your classified telephone directory.

FREE BOOKLET gives you the whole story on Alcoa Aluminum Pipe. Write for your copy today.

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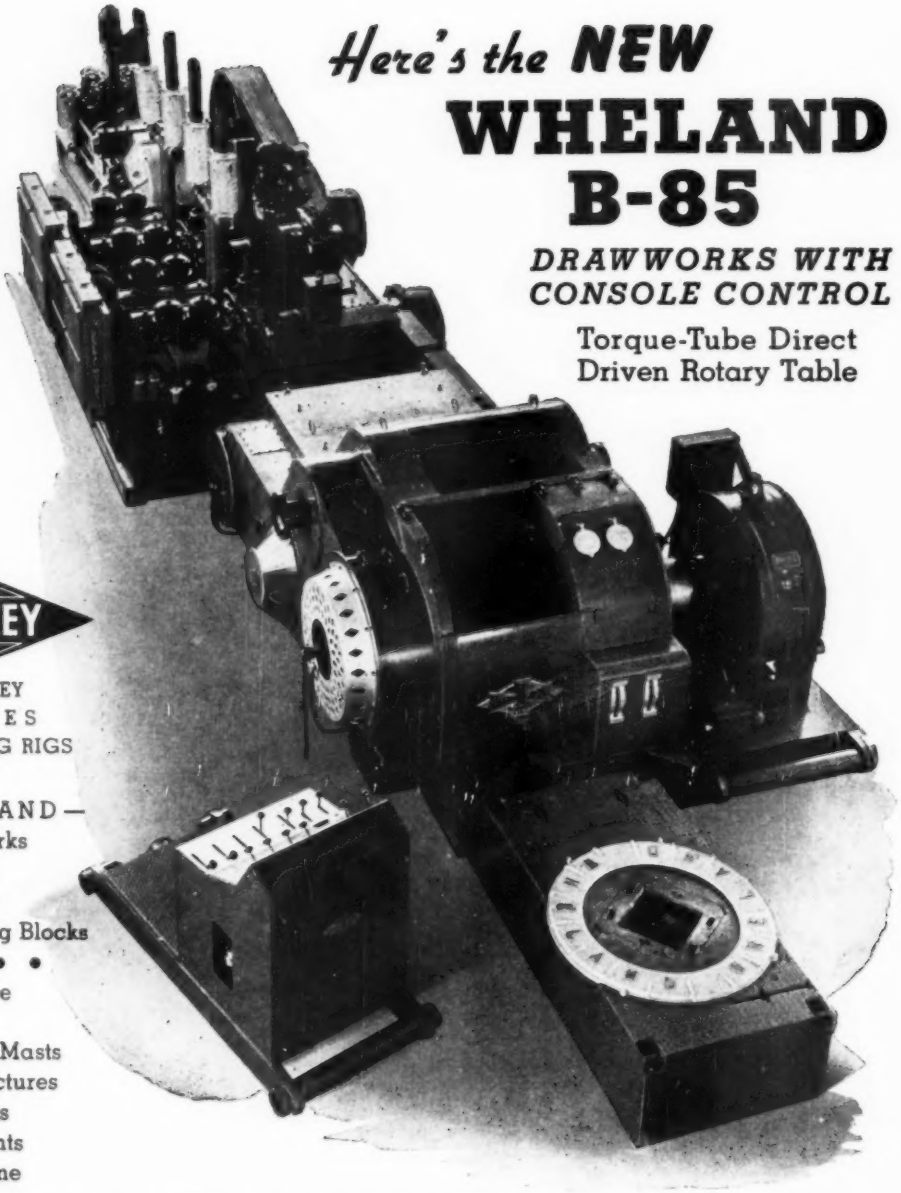

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For resistance to frictional wear...

GUN IRON CASTINGS

If there are cast wearing parts in your products or equipment, it will pay you to investigate the advantages of Gun Iron. Since its original development over 139 years ago, Gun Iron and its alloys have proved superior for wear resistance on literally thousands of different applications.

Taking one industry as an example, Gun Iron is used for steam locomotive cylinder and valve packing rings and bushings, cross-head shoes and rod bushings to name a few. On all of these, friction is extremely severe due to irregular lubrication. Because of the exceptional performance of Gun Iron, it is specified for these parts by most leading engine manufacturers and railroads.

Gun Iron is produced in air furnaces similar to steel open hearth furnaces and has a dense, close-grained, 100% pearlite micro-structure with an even distribution of flake graphite throughout. It also has exceptional resistance to high heat, impact, corrosion and erosion and damps vibration more effectively than other irons. Our engineers and metallurgists are at your disposal to discuss the application of Gun Iron to your strategic cast parts . . . our furnaces, foundry and extensive machining facilities stand ready to produce them accurately and economically. Why not write for more details today?

GUN IRON *in the* PETROLEUM INDUSTRY

Hunt-Spiller casts and machines many parts for the petroleum industry. A few are listed below:

LINERS, PISTONS AND RINGS FOR HOT OIL PUMPS • BUBBLE CAPS AND TRAYS • TUBE SUPPORTS • PRESSURE CASTINGS

Chances are that there are many other places where Gun Iron can solve a design or operating problem. To help you determine the value of Gun Iron for your cast parts, our metallurgical department has prepared a comprehensive bulletin which contains complete properties and discussions of Gun Iron and many other metals. Engineers claim it an invaluable reference aid. Send for your free copy today.

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Canadian Representatives: Joseph Robb & Co., Ltd., 4050 Namur St., Montreal 16, P. Q.

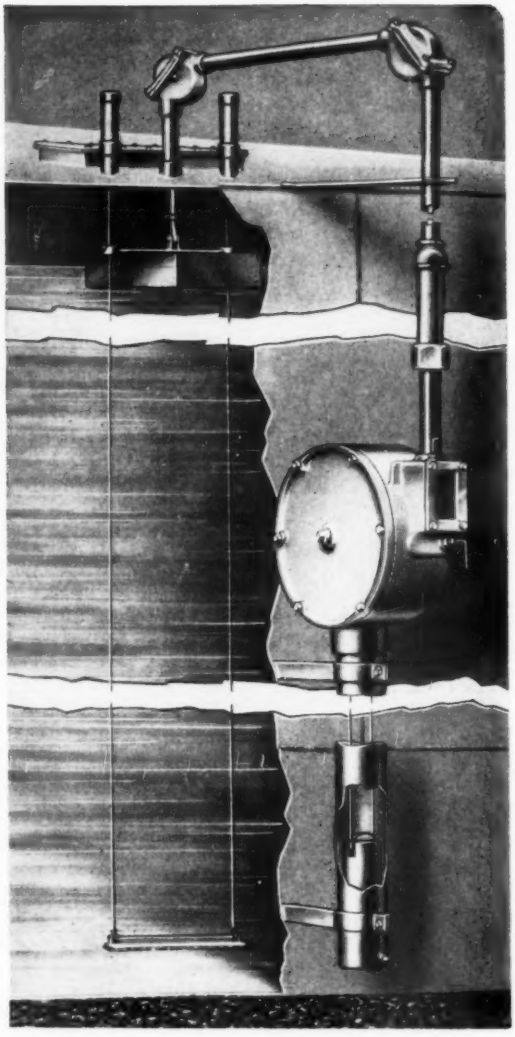
Equip Your Tanks WITH AUTOMATIC GAUGES

Gauging Petroleum Storage Tanks automatically has become such standard practice on all new installations of refinery and bulk storage tanks that one is likely to jump to the conclusion that this is the only way gauging is being done.

We know, of course, that there are thousands of storage tanks in all parts of the world, where men still have to climb to the tank top, open a gauge hole cover, lower a graduated steel tape and record the reading in an inventory book.

That method is slow, dangerous, expensive, and far less accurate than automatic gauging, in which the gauger merely takes a reading of the tape at ground level—eliminating the dangers of climbing ladders in all kinds of weather, damage to tank tops, personal hazards of asphixiation.

We manufacture a complete line of automatic tank gauges which are applicable to practically every type of storage tank used in the petroleum industry, so no matter how ancient the vintage of your tanks, no matter what type of roof—we can supply you with an automatic tank gauge.



Shown above is our automatic tank gauge No. ST-2935, adaptable to cone, dome, water top, cylindrical and other types of tank roofs. We also manufacture electric remote reading gauges which are the last word in accuracy and speed and SAFETY.

SHAND & JURS CO.
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S&J

SHAND & JURS

WHERE YOU SEE THIS... YOU SEE

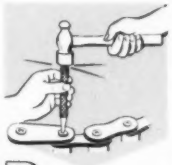
Longer Chain Life, Lower Chain Cost, Easy Adjustment, Faster Service!

This distinctive "teardrop" shape link marks the new "BA"... Baldwin Assembly . . . oil field roller chain. And it's the mark of long low-cost drilling service.

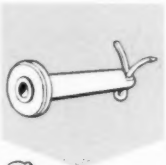
The new "BA" assembly roller chain gives you all the advantages of riveted roller chain . . . long life . . . greater strength . . . lower cost . . . plus even greater ease of field assembly and disassembly than with old style detachable roller chains.

HERE'S HOW SIMPLE IT IS!

A The single pin connector is the heart of the "BA" assembly and is readily identified by its "teardrop" shape. One pin in this link has a cotter on one end; the other end is spun over a washer. The other pin is fully riveted to the adjacent link, thus assuring the assembly of the superior life of riveted chain.



B To take the chain apart, simply remove the cotter on the single pin connector link and drive out the pin. Pin is a slip fit through the chain except for a milled flat on the cottered end which is fitted into a special hole in the connector plate. There is no danger of destroying fits or damaging parts with this chain.



C The single pin connector of the "BA" assembly fits snugly into place . . . even though it is a slip fit through virtually the entire link. The washer spun over one end of the pin and the milled flat on the cottered end that is fitted into the special hole in the connector plate, plus the cotter, hold the pin firmly in place.

D An important advantage to you is the fact that the other end of the single pin connector link is firmly riveted to the adjacent link. When the single pin connector is removed, this riveted pin holds the chain parts together, preventing plates from falling out and greatly simplifying assembly.

For all the facts on the "BA" assembly, Rex A.P.I. Chains and Rex Oil Field Pumps, see your local supply store or write Chain Belt Company, 1619 W. Bruce Street, Milwaukee 4, Wis.

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ROLLER CHAINS

a complete line from ¼-inch to 2½-inch pitch

CHAIN BELT REX COMPANY

A.P.I. CHAINS

Stay on the Job...Longest!

These famous rotary drilling chains . . . *the chains that have grown up with the oil fields* . . . are built especially for oil field needs. Their ability to take the stresses and strains of tough drilling is the result of such outstanding features as:

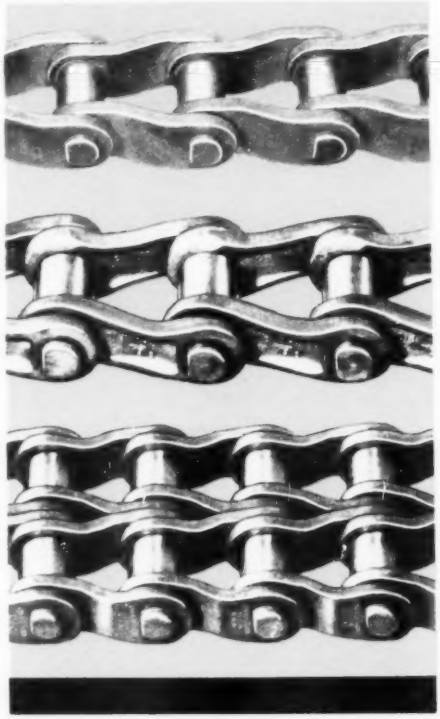
BALANCED DESIGN, an important Rex advantage that balances the strength of the chain parts for increased efficiency . . . longer life . . . lighter weight.

MAXIMUM WEAR RESISTANCE, effected by carefully hardened and finished pins, bushings and rollers. All are made from solid stock alloy steel. Pins and rollers are of heat treated, high carbon alloy steel. Bushings are of alloy steel, case hardened for wear resistance.

FORCE FIT ASSEMBLY. Chain parts are carefully machine-assembled to form the famous Rex Unit-Link. Each link is exactly alike . . . each is put together to stay . . . to retain its strength and uniformity under the toughest of drilling conditions.

EFFECTIVE LUBRICATION that prolongs chain life. Oil holes in the bushings put oil where it is needed.

EASY TO TAKE APART. Rex 3-diameter pin makes assembly and dis-assembly easy. No need for heavy driving or the use of drift pins.



Rex Champion Chabelco A. P. I. No. 3. Ultimate strength 75,000 pounds.

Rex Champion Chabelco A. P. I. No. 4. Ultimate strength 170,000 pounds.

Rex D3125 A. P. I. No. 3⅛. Ultimate strength 230,000 pounds.

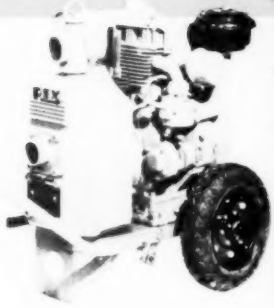
CHAIN BELT REX COMPANY

OIL FIELD PUMPS

THE IDEAL PUMP OF OIL FIELD UTILITY SERVICE

The handy Rex "little yellow pump" is used wherever water is pumped. Its lightweight, durable pressed steel body assures easy portability from job to job. Exclusive "adjustable air peeler" and replaceable wearing plate assure new pump efficiency for lifetime of the pump. The peeler permits the pump to handle vapors without losing its prime.

For dependable utility service, rely on Rex, the "little yellow pump." You just start the motor and forget the pump. It keeps right on going while there's water to pump.



Rex Oil Field Sales Offices Are Located in the Following Cities:
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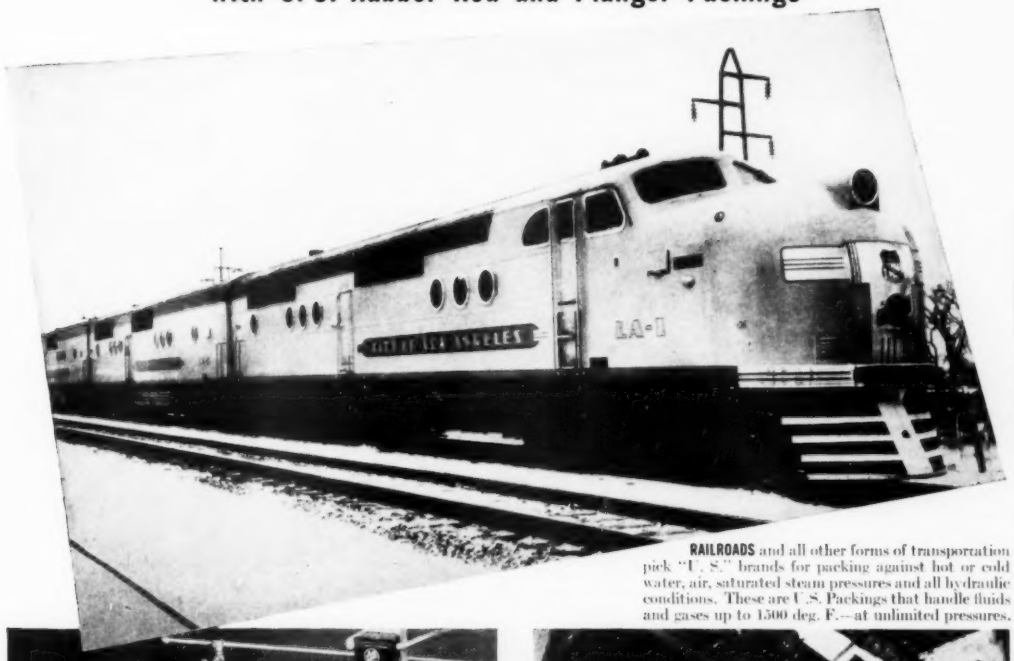
BALDWIN-DUCKWORTH DIVISION
Springfield 2, Mass.

REX CHAIN & TRANSMISSION DIVISION
Milwaukee 4, Wis.

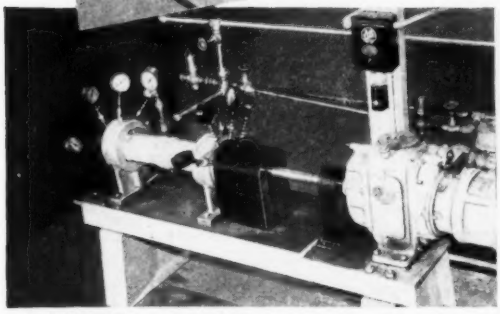
REX CONSTRUCTION MACHINERY DIVISION
Milwaukee 4, Wis.

PACKINGS FOR EVERY NEED

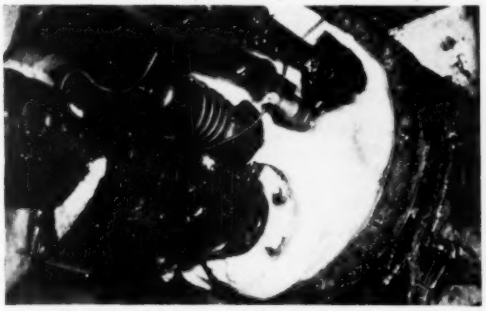
Every field of Industry and Transportation saves money with U. S. Rubber Rod and Plunger Packings



RAILROADS and all other forms of transportation pick "U. S." brands for packing against hot or cold water, air, saturated steam pressures and all hydraulic conditions. These are U.S. Packings that handle fluids and gases up to 1500 deg. F.—at unlimited pressures.



U. S. PACKINGS are tested in the laboratory under conditions that are more difficult than they will encounter on the job. The specially designed centrifugal pump (above) duplicates various working conditions to determine the service life of packings.



SOLVENTS in a solution used by this Oliver Dewaxing Filter took the lubrication out of the packings. "U. S." provided a packing which withstood the solvents. There is a U. S. Packing for any job, from ammonia to destructive chemicals at high pressures.

You get absolute reliability of performance from any member of the complete line of U. S. Rubber Company packings. Constant research carried on in the most modern physical and chemical laboratories guarantees the finest in design, materials and workmanship. Whatever your packing problem, it will pay you to consult a "U. S." engineer. Write to address below.

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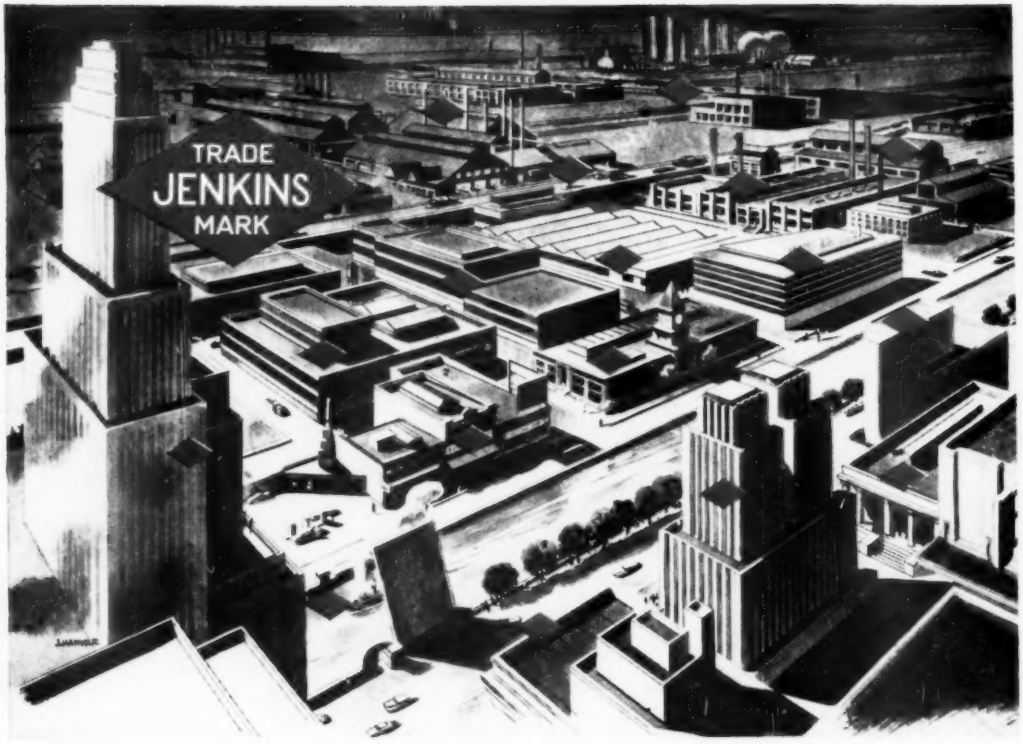

Acres of Diamonds

YOU SEE only the structures of commerce, soaring skyward . . . the strange new shapes of industry stretching beyond. Yet all around you are acres of diamonds. Diamonds that identify the thousands of Jenkins Valves on duty in the many different types of buildings essential to modern civilization.

Nothing holds its value like the diamond, in valves as in gems. Four generations of American builders have placed their trust in the Jenkins diamond and signature trade mark. Today, as in 1864, Jenkins Valves are the choice of men who plan shrewdly, always with an eye to future maintenance and operating costs.

They know that Jenkins builds extra endurance into Valves — proved by long life and low upkeep cost records in every type of service. They know, too, that there is extra value in the *experience* Jenkins Valve specialists can apply to any question of selection, installation, or maintenance.

You pay no more for Jenkins Valves, despite their superior quality and service. So why not let the Jenkins diamond serve as your guide to valve economy . . . for new installations, for all replacements. *Sold through leading Industrial Distributors everywhere.*

JENKINS BROS.

80 White St., New York 13;
Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.

JENKINS
LOOK FOR THE DIAMOND MARK
VALVES
SINCE 1864
TRADE JENKINS MARK

They Say—

Explanation Wanted

Sir:

I've been reading all sorts of arguments lately about President Truman's proposal to reduce or abolish the 27½ per cent depletion allowance before income tax on profit from oil production.

So far I have failed to notice any analysis of the situation which would be intelligible to the layman, and especially to the crackpots, mendicants, and gangsters who, combined with the conservative element of the Solid (ivory, that is) South, make up the small majority of the voters who are responsible for the cancerous political growth which is so rapidly devouring the capital on which our economy is based.

Why don't you write a piece about it in very simple language?

You should explain that an oil field, unlike agricultural products or other substances or sources of revenue, which are based on work and or brains and are constantly renewable by the continuation of effort, is ultimately and calculably exhausted. No depletion allowance can be large enough to guarantee the discovery of another deposit of equal size.

If any business, or situation, should have the relief of the capital-gains tax it should be the oil business. If I discover an oil field and sell it, lock, stock, and barrel to a company that is interested in taking out the oil and refining it, I pay only the capital-gains tax. Why does the next owner, who takes the oil out piece meal, not have the same right to conserve his capital.

I think you should write a piece about it.

Glenn M. Ruby,
Vice president,
Exploration Contractors, Inc.,
New York.

Money-Making "Loophole"

"The President in his tax message said one man had an income of $1,000,000 a year for the 5 years 1943-1947 and by using it to drill for oil escaped income taxes on it and now has properties yielding $5,000,000 a year.

"It is too bad for the revenue (department) there are not more such men because these properties must be worth $25,000,000, and when he dies the federal estate tax thereon at present rates will be 65 per cent on half thereof, or $8,000,000, and also if he now has an income from the property of $5,000,000 a year he pays an income tax of 80 per cent on half of his income, or $2,000,000.

"If he had not drilled for oil the

TAKE THE GUESS OUT OF GAUGING!

Why take a chance on gauging errors? Why climb to the top of the tank unless absolutely necessary? With "VAREC" Automatic Tank Gauges, you can do your gauging on the ground and do it accurately.

A still further refinement is to take your gauge readings in your office. All of your tanks can be gauged from a central location, and just as accurately, with a "VAREC" Remote Reading Electronic Gauger.

If sampling is required on pressure tanks, "VAREC" offers an exacting gauging and sampling unit, Fig. No. 410, and sampling bomb, Fig. No. 420.

There is "VAREC" Automatic Gauging Equipment designed for high and low pressures and all gauging requirements. Send us your problems today and let us assist you in accurately gauging your tanks the easiest way.

THE VAPOR RECOVERY SYSTEMS CO.

PROVED and APPROVED "Varec"

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RIGGING UP EQUIPMENT . . .
Setting Boilers
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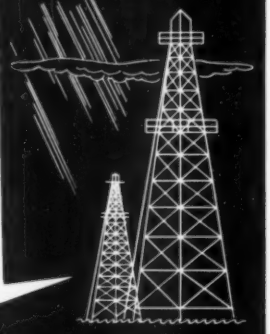
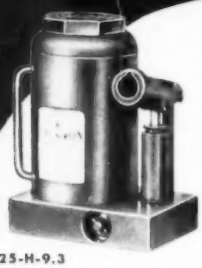


DUFF-NORTON
JACKS



Big jacks . . . small jacks . . . jacks with lifting capacities ranging from 3 to 100 tons . . . all are available from the Duff-Norton complete line of jacks for every lifting and lowering requirement in the oil industry.

No. 25-H-9.3
Hydraulic Jack

The jacks illustrated are hydraulically operated for use in low height areas. The 25-H-9.3 is 9¾" high with a lifting capacity of 25 tons. The 30-H-4.5 is only 4½" high and will lift 30 tons. For more data on these and other time and effort saving jacks . . .

WRITE FOR
CATALOG
203-U

No. 30-H-4.5
Lo-Hite Hydraulic
Jack with
independent pump

DUFF-NORTON JACKS
ESTABLISHED 1883

THE DUFF-NORTON MANUFACTURING CO.
MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA.—CANADIAN PLANT, TORONTO 6, ONT.
"The House that Jacks Built"

Treasury would have collected only about $4,000,000 in income tax from him for 1943 to 1947 inclusive.

"Thus, instead of losing money by the provisions the President attacks the Treasury gains as above stated.

"Furthermore, if depletion allowance is modified, then oil producers should have the same treatment afforded timber operators who only pay 25 per cent tax on timber sold under Sec. 117 (h) of the Internal Revenue Code. Oil, unlike timber, is irreplaceable.

"I am writing you on my own behalf as an oil operator."

John E. Hughes, Chicago, in a letter to Russell B. Brown, general counsel, Independent Petroleum Association of America.

Last Edition

"Quiet, gentlemanly Jimmy McIntyre,* 77, died at his home in Tulsa late Tuesday after a long illness, and the oil writing fraternity lost a hand that had recorded history for many years.

"You'll have to look in the books to learn when he joined The Oil and Gas Journal, but it was a long time ago; he held every job in the editorial department and earned a rest. But, when the younger members put on uniform "Jimmy" went back to the office, dusted off an old typewriter and went to work, with the comment, 'We've still got work to do.'

"Jimmy's yen for accuracy and detail helped make the Journal the 'yellow-back bible of the oil industry'; his judgment and comment was respected by high and low in oildom."

*Editor of The Oil and Gas Journal from 1921 to 1934.

Claude Barrow, oil editor, the Daily Oklahoman, in "The Slush Pit."

Coal's Future

"The future in the field of synthetic fuels lies with coal, the resource, and not necessarily with the coal industry as we know it today. The synthesis of oil products from coal requires a large capital investment far beyond the financial reach of today's average coal company. It is very possible, therefore, that the oil industry, not the coal industry, might foster the development of synthetic fuels in an endeavor to enlarge its limited sources of supply. . . .

"The preponderance of coal reserves over those of competitive fuels assures coal a promising long-run future, but does not guarantee the coal industry a secure position during the next several decades, when oil and natural gas will be probing in all directions seeking new markets. Our plans for at least the next generation should allow for keen competition from these fuels. . . .

"Current statistics indicate that the coal industry is moving less, rather than more, of its product into the electric-utility field, which was thought to be an increasingly ex-

panding market for coal. A comparison of fuel consumption by electric utilities in the first 11 months of 1949 with the same period in 1948 shows that natural gas and oil use has increased 15.9 per cent and 51.8 per cent respectively, while the consumption of coal has declined 15.6 per cent in the same period. If these figures are a portent of the future utility fuel market structure, then the coal industry should take aggressive action to meet the challenge."

Reed Moyer, assistant to the vice president, Central Indiana Coal Co., address before Indiana section, American Chemical Society, Indianapolis.

Engineer Defined

M. C. Callahan, superintendent of telephone and telegraph, Gulf Refining Co., Tulsa pipe line division, has handed us a definition of an engineer, devised by L. E. Adler, editor of Setco News, publication of Southern Electric & Transmission Co., Dallas. Here it is:

"An engineer is one who passes as an exacting expert on the strength of being able to turn out, with prolific fortitude, strings of incomprehensible formulae calculated with micrometric precision from extremely vague assumptions, which are based on debatable figures acquired from inconclusive tests, carried out with instruments of problematical accuracy by persons of doubtful reliability and of rather dubious mentality, with the particular anticipation of disconcerting and annoying fanatics described altogether too frequently as designers."

Attack on Smog

". . . Down at Torrance . . . General Petroleum is known as a 'good neighbor.' One of the big factors in gaining this reputation has been careful handling of smoke and fume emission . . .

"The biggest single installation in smoke and fume control will go into operation in March 1950. It is a hydrogen sulfide absorption unit which is costing over $600,000. It will extract about 125,000 lb. of hydrogen sulfide from refinery gases each day.

"Other major installations include:

"1. A 'smokeless burner' of unique and original design installed at a cost of $140,000.

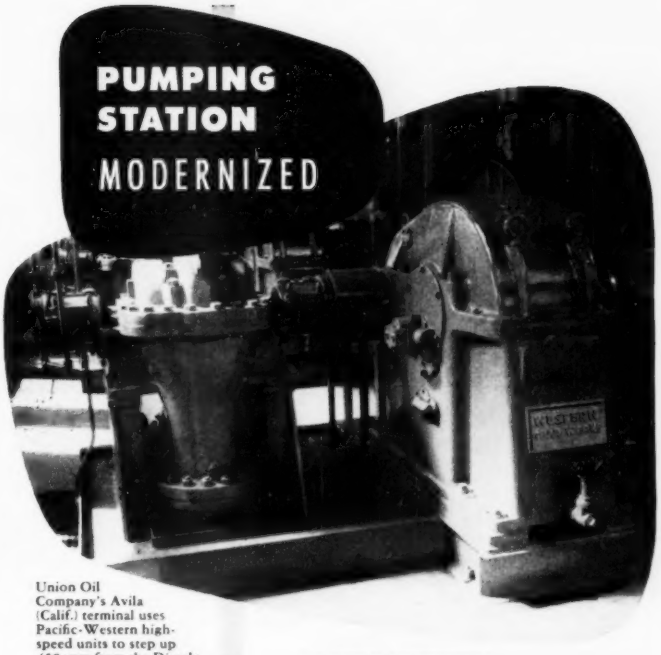
"2. A smoke absorption installation which cost $52,000.

"3. An odor-abatement system in caustic sludge processing, installed at a cost of $15,000 with $80,000 spent in expansion.

"4. A dust-collection system now being installed on TCC units at a cost of $25,000 even though dust emission is small and well below legal limits.

"Other improvement projects costing a total of $250,000 are now in the design stage."

Doings in General, General Petroleum Corp.

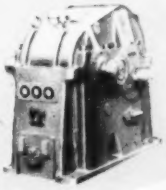


Union Oil Company's Avila (Calif.) terminal uses Pacific-Western high-speed units to step up 450 rpm from the Diesels to 1780 rpm to the pumps.

PACIFIC-WESTERN
High-Speed Units Installed

Modernization of Union Oil Company's Avila terminal and expansion of its capacity to 20,000 bbl per hour has resulted in reduction of tanker loading time by one third, with a fuel saving of 80 to 90%.

A feature of the modernization was the installation of dual-fuel Diesel engines to operate centrifugal pumps. The required speed increase was obtained efficiently through the use of Pacific-Western high-speed gear units.



A typical Pacific-Western high-speed unit for pumping installations. All lubricating-oil and heat-exchanger piping is protected by enclosure within the case. Temperature and pressure indicators are conveniently grouped on an instrument panel. The oil pump is mounted on the outside for easy accessibility.

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JOURNALLY Speaking

Endogenous Force

THIS picture is not a gusher, a wild gasser, nor a fire.

It was sent in to show why an Italian firm should subscribe to the Journal. It illustrates (1) the meticulousness of our circulation department and (2) the diverse utility of our technical articles and advertisements.

It all started when a subscription order came from a firm in Florence, Italy, named "Larderello" S.p.A. Sfruttamento Forze Endogene. As you may know, we don't sell our favorite oil publication to just anybody. You gotta be a genuine oil man or the very next thing to it to join the elite circle. And Larderello didn't appear on any list of Italian oil operators.

Recourse to an Italian-English dictionary translated the firm's name as "Company for Exhausting Endogenous Force." This threw the circulation boys for a loop, and even Webster's definition of endogenous as "from within" didn't solve the mystery. So they wrote asking how come Larderello was interested in American drilling methods and equipment.

The reply was accompanied by this actual photograph of endogenous force exhausting. Larderello, the letter explained, is engaged in producing electric power and chemical products from volcanic steam obtained by drilling in various regions of Italy, and the company is very much interested in drilling and pipe-line equipment. This picture is the 62 Larderello, which was completed January 20, 1950, with a capacity of 80,000 to 100,000 kg. of steam per hour.

Larderello got the subscription.

Index Out

IF you found the Journal useful last year (and who didn't), and if you kept a file (and many do), and if you need to refer back to something (and most everybody does)—you need our 1949 Index.

You can get a copy for free by just dropping a line to our circulation department.

Instead of binding it into one of our regular issues we print it as a separate, 48-page booklet because we have found it is more useful to more people that way. If you're a filer you can file it neatly on the shelf with all the 1949 Journals (it's the same page size), and if you're a stuffer you can stuff it into your desk drawer where you'll be sure you can find it in a hurry.

To our gratification, the number of requests for our index increases markedly every year. This proves, we feel sure, that more people are realizing that the Journal is a permanent reference work of continuous value in addition to a weekly courier of the latest and the newest doings of the industry.

If you want to be certain of getting your own, personal, free copy, don't fail to send your request immediately if not sooner.

We're delighted to comply.

Or Falling Pound

IN a new directory of Canadian oil companies we noted one named Jumping Pound Petroleum, Ltd., and were it not for the fact that there is an oil field up there by that name we would conclude that this concern deals in some of that sterling oil we hear so much about these days.

—Henry D. Ralph

what are your needs ?

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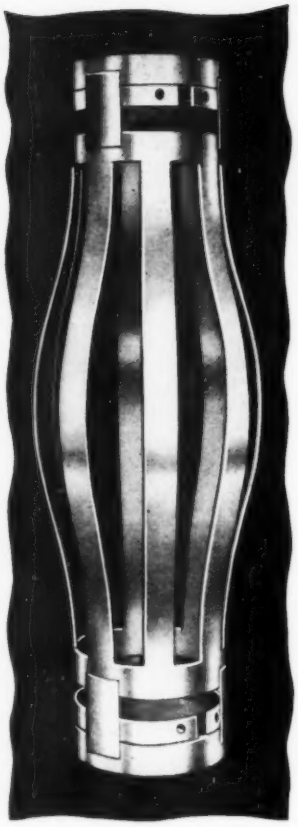
"TORTURE TESTING" definitely proves Baker Model "G"



Casing Centralizers provide MAXIMUM CENTERING FORCE

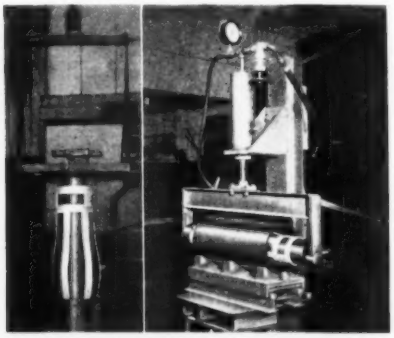
Only when "maximum centering force" is applied to casing at the cementing point, can you obtain a sufficient annular space to permit uniform distribution of the cement slurry completely around the casing. The hazard of channeling is minimized, and chances for successful "first time" cementing are increased.

The test of any casing centralizer is its ability to exert MAXIMUM CENTERING FORCE *after* repeated flattening of its springs during the trip down-hole. That's why the Baker testing laboratory has been kept in constant use during the designing, development and actual proving of the Baker Model "G" Casing Centralizer. Comprehensive tests, simulating every conceivable hole condition to which a centralizer is subjected, were performed in arriving at its efficient design.

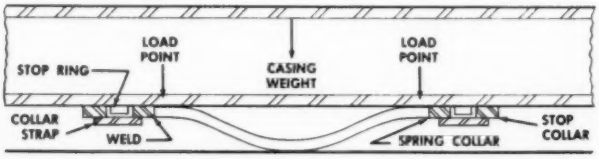
During the course of these tests, every type of spring-equipped centralizer was studied. The exclusive design of the Baker Centralizer proved conclusively to be the optimum.

And here are the outstanding features of the Baker Model "G" Casing Centralizer confirmed by "torture testing" . . . 1. Its MAXIMUM CENTERING FORCE is exerted when it reaches the cementing point, regardless of how many times the springs have been flattened due to "dog legs" or tight spots in the hole. 2. The springs are securely butt-welded to the spring collars in a design that imposes the load point *upon the casing*. 3. *All springs compress simultaneously*, and cannot be compressed individually. 4. The *casing can be rotated* while the centralizer remains stationary. 5. It starts easily, without "snubbing." 6. All parts of the assembly are pre-positioned, ready for immediate, easy installation on the casing.

Ask any Baker representative or office for *your* copy of the new 16-page brochure which contains complete details and illustrations of the Baker Model "G" Casing Centralizer.



LEFT: Testing to determine the maximum number of springs of optimum bowed height to permit easy starting without "snubbing." RIGHT: With this testing device it is possible not only to simulate rugged down-hole travel by repeatedly flattening the springs, but also to find the effective centering force of the centralizer in the open hole after such treatment. The MAXIMUM CENTERING FORCE can easily be determined from a performance curve showing the centering force at various intervals of deflection.



Here is the ideal in spring design and mounting, found only in the Baker Model "G" Casing Centralizer. Note how the load point is imposed directly upon the casing; and how the properly "contoured" spring is free to move along the smooth surface of the casing as it deflects under compression. There is no chance for concentration of stress to cause a permanent set, or breaking of the spring. Note that ample clearance exists between Stop Rings and Centralizer Collars to accommodate the increased length of the springs that results from their complete flattening.

***Remember!* You get MAXIMUM CENTERING FORCE only with BAKER Model "G" CASING CENTRALIZERS**

BAKER OIL TOOLS, INC. HOUSTON • LOS ANGELES • NEW YORK

Natural-Gasoline Threat

WE have stressed from time to time the increasing importance of products classified as "light hydrocarbons" in total domestic oil supplies. Current market conditions emphasize that the disposal of these lighter products must have special consideration this year, starting immediately. Trends in these products have a direct bearing on the weakness or strength of the entire motor-fuel market.

The latest B. of M. report for November shows light-hydrocarbon output up 10.2 per cent over November of the previous year and 100 per cent over November 1942. In contrast, crude-oil output in November was 8.2 per cent less than in November 1948, and only 35.4 per cent greater than in November 1942. Natural gasoline, with which this comment is concerned, accounted for 205,000 bbl. daily of the 474,000-bbl. daily average in November.

Owing to the expansion of cracking, the refinery production of these lighter products is also increasing. This enlarged supply at field plants and refineries and reduced export sales have brought about a situation in which sales have not kept pace with enlarged output.

As to remedies, the time has arrived for the oil industry to end the attitude that natural gasoline is a "stepchild" and adopt realistic answers to problems having to do with that product's place in the motor-fuel market

Partially it is a problem of the state conservation bodies. In the furtherance of their programs they have in effect forced the construction of some of the postwar natural-gasoline plants. The conservation bodies can and should consider natural gasoline and related products as part of the total raw-material supply and act accordingly in arriving at monthly allowables.

Then there is the responsibility of the companies manufacturing the natural gasoline. A large part of the new supply comes from plants owned by companies which either directly or through affiliates are also refiners.

These concerns would not think of producing crude oil for which there is no ready market. The same rule can be applied to natural gasoline. Large quantities have always been sold on the open market, but when these purchases are inadequate the manufacturers should assume the responsibility of absorbing all or a part of their output within their own organizations.

The foregoing is offered by market students as the answers for current conditions. There are other problems which will require longer consideration. Changes in engine design which would permit an increase in vapor pressures in both winter and summer motor fuels would be helpful.

Every assistance should be given to those connected with research and development who are reporting progress in the efforts to develop commercial operations which will crack the lighter hydrocarbons into heavier products coming within the range of motor fuels, including high octane.

Progress and expansion in the oil business always brings new problems. United consideration and action involving both supply and demand will solve this one centering in the industry's light hydrocarbons.

THIS WEEK

INDUSTRY AFFAIRS—Sunray - Barnsdall merger appears inevitable as stock purchase is approved. . . . ¶Industry witnesses riddle Treasury's characterization of depletion allowance as "loophole." . . . Strongly defend allowance as necessary to maintain crude reserves. . . . Observers believe Congress will reject administration's depletion changes. . . . ¶Texas' method of proration by MER's may be heavily attacked at next meeting of Railroad Commission. . . .

NATIONAL AFFAIRS—Diplomatic negotiations on British Empire curbs on dollar oil bogged down over latest British "offer." . . . British "substitution" policy and "incentive" program for American companies termed unacceptable. . . . Offer contingent on continued ECA funds and free hand in expanding European refining capacity. . . . ¶Bill to give FPC control over financing of natural-gas pipe lines attacked by industry witnesses as unnecessary. . . . ¶House committee approves bill for outright state control of tidelands oil. . . . Tidelands compromise appears dormant. . . .

ECONOMICS—Socony-Vacuum economist says price of crude probably will remain at current level. . . . ¶Oil imports reached new record high of 794,000 bbl. per day in December. . . . ¶Projected cut in price of Alberta crude would permit it to compete with West Texas crude in Great Lakes region when transportation facilities are completed. . . . ¶Utilities swing heavily to oil and gas, displacing coal as fuel. . . .

TRENDS—Total crude stocks on February 4 were 6,353,000 bbl. less than the same week last year. . . . Stocks of Texas crude were off 11,602,000 bbl. and Illinois-Indiana-Michigan crude decreased 2,151,000 bbl. . . . California crude increased 4,476,000 bbl. in the same period. . . . Stocks of Louisiana crude gained 2,435,000 bbl. for the year, including an increase of 488,000 bbl. in the last 2 weeks. . . .

ACTIVITY—Crude-oil production for the week ended February 11 averaged 4,870,800 bbl. daily, down 8,250 bbl. daily from previous week. . . . ¶Total well completions were off 40 wells for the week to 753. . . . Wildcat completions declined 22 to 134 wells. . . . ¶Total rotary rigs operating in United States decreased from 1,909 rigs on January 30 to 1,885 on February 6. . . .

INTERNATIONAL—Wildcatting in Colombia at low ebb though crude production at record high. . . . ¶British-Argentine meat-oil barter not living up to expectations. . . . ¶American Independent's first well in Kuwait Neutral Zone is dry. . . . ¶Australia ends gasoline rationing in defiance of Empire policy to limit oil purchases. . . .

PIPE LINES—Montana-Dakota Utilities Co. awards contract for 340-mile, 12-in. natural-gas line from Worland field, Wyoming, to Cabin Creek, Mont. . . . Construction to begin in the spring. . . . ¶Mid-Valley Pipe Line Co. awards contract for 110-mile, 20-in. section of line between Longview, Tex., and Haynesville, La. . . . ¶Pan American Production Co. plans crude-oil gathering system in Kelley field, Scurry County, Texas. . . . ¶Gulf Refining Co. lets contract for 30-mile, 8-10-in. crude line to handle 25,000 bbl. daily of Scurry County production. . . . ¶Southern California Gas Co. planning construction of 80 miles of 30-in. line from Whitewater to Puente, Calif. . . .

REFINING—Sun Oil Co. lets contract to Catalytic Construction Co. to double capacity of its catalytic polymerization unit at Toledo refinery. . . . ¶Modernization work at Socony-Vacuum East St. Louis refinery is nearing completion. . . . ¶Operation of Panhandle Producing & Refining Co.'s new $1,000,000 fluid catalytic cracking plant at Wichita Falls, Tex., is slated soon. . . . ¶Imperial Oil, Ltd., installing new propane-plant facilities at Sarnia, Ont., refinery. . . .

COST CUTTING.—Sun Oil Co. spent $6,500,000 on this new compounding, blending, filling, and packaging plant for lubricants adjacent to its Marcus Hook refinery. It is one of several modern lube plants completed by the oil industry in the past year or two, designed to cut costs by assembly-line methods and other efficiencies.

Oil-Tax Battle

Depletion-allowance hearing brings oil-industry spokesmen to Washington with arguments against Treasury proposal

Bertram F. Linz

WASHINGTON. — Oil-industry spokesmen told the House ways and means committee last week that if it wants to insure adequate oil for another war it should let the depletion allowance stand at 27½ per cent.

Their argument was supported by Ernest O. Thompson, of the Texas Railroad Commission, who made a flying trip to Washington to tell the committee that the nation needs a reserve of 2,000,000 bbl. a day against a possible war, today hasn't half that much, and it isn't safe to do anything that would impede development.

Thompson's contention.—The saving of $200,000,000 which the Treasury says would accrue from a cut in the allowance from 27½ to 15 per cent would be "poor economy," Thompson asserted. We cannot afford to tamper with a system that is getting the job done, he said.

Thompson explained that the development of a war reserve must be carried out in peacetime for when war comes there is no time to drill, no steel, and no manpower to be spared. Equally to the point, a cut in depletion would put many stripper wells out of business, cutting into the cushion which already has been built up and losing permanently a large volume of reserves.

Because of the lack of time in which to prepare a presentation, the committee heard only four members of the general depletion committee and one association representative, Phil Faine, secretary of the Ohio Independent Oil and Gas Producers. It promised a hearing this week for a number of others.

Brown testifies.—The industry fight for retention of the present rate was kicked off by Russell B. Brown, general counsel of the Independent Petroleum Association of America and cochairman of the industry committee, who told the congressmen the depletion provisions were specifically designed to meet the peculiar problems in finding and developing oil and gas, and the "result" of decades of experience and experiment."

The allowance is not a loophole, Brown asserted, and has been studied and restudied by Congress, and he pointed out that no attack has been made on the principle of depletion but only on the rate. But, he charged, the 15 per cent rate proposed by the Treasury was "picked out of the air" and no support has been offered for the change.

Brown assailed Treasury witnesses who picked out "selected" cases of inordinate profit, and said it was as ridiculous to figure the effect of depletion on the industry generally on that basis as to judge the earnings of all racing fans on the profits of a man who won the daily double.

As to the profits from depletion made by individuals and companies from other industries who used war profits to get into the oil business, Brown told the committee that so far as he knew all these outsiders have abandoned their oil projects, which never amounted to much in the way of oil found.

It was the depletion allowance, Brown said, that made it possible for the United States to oil the last war and put the country today in the comfortable position of having the largest proven reserves in its history.

"The oil industry has paid a fair and proper share of taxes and has not enjoyed unusual profits," he declared. "Illustrative of this is the fact that if the industry were profiting unduly, investment capital would all be directed into the oil industry, causing an enormous and disproportionate growth. As a matter of fact, exactly the contrary is true. . . .

"Based on the experience of the oil industry, the direct effect of the Treasury's proposed tax increase would be to reduce seriously in a very few years the productive capacity that otherwise would be developed. The loss in capacity might eliminate entirely the reserve productive capacity needed for national security."

Rodman's belief.—Following Brown, Roland V. Rodman, president of Anderson-Prichard Oil Corp., Oklahoma City, and a member of the industry committee, attacked the Treasury's position on the deduction of intangible drilling and development costs.

Although the Treasury charged that depletion and expensing of costs constituted a "double deduction," Rodman pointed out, it has not recommended that either be eliminated.

"On the contrary," he said "the Treasury recommends that both provisions continue as deductions but that the intangible drilling and development cost deduction operate as a new and further limitation on percentage depletion. In other words, the Treasury, after all its fanfare about the intangible drilling cost deduction being a double deduction, agrees that it is one of the incentive provisions which should remain in the law but recommends that it be used to reduce the amount allowed because of percentage depletion deduction. In short, the Treasury has concentrated its whole attack on percentage depletion as applied to oil and gas and recommends that the deduction be reduced in two ways."

Rodman contended that depletion today is not great enought to provide the tax-free reserve for replacement of depleted properties by the acquisition of newly discovered ones for which it was intended. The Treasury's own figures, he said, show that on the average only 17½ per cent, or 44 cents a barrel of $2.50 oil, is actually allowed at the present rate and that even in the case of carefully selected corporations the rate allows only 25 per cent, or 62 cents a barrel, yet it costs at least $1.10 to $1.25 per barrel to replace the oil produced, either by exploration and development or purchase of developed reserves.

Two other facts show that the present allowance is not excessive, Rodman asserted; one the fact that over a long period of years companies in the oil industry have earned a smaller profit on their net worth than have manufacturing companies, the other that although the oil industry has had to increase its indebtedness over the years it has not been able to distribute as high a ratio of its profits as other industries because of the reinvestment of income necessary to maintain adequate oil reserves.

Reduction of the industry's allowances, he warned, would have several serious consequences.

1. Venture capital would be repelled in an amount far in excess of the actual reduction in the depletion allowance and discoveries of new reserves would be seriously diminished, with a resulting ultimate increase in the price of fuel and an immediate reduction in oil supply and taxable income of oil producers.

2. The price of products would in time increase to reflect the changed supply conditions as well as the increased tax with all the dislocating effects this would have on the economy, including the ultimate reduction of the nation's aggregate taxable income through increased operating costs of petroleum users with a corresponding reduction of tax revenue.

3. Dividends of oil companies would be reduced, with a consequent loss of tax revenue that could easily account for 50 per cent or more of the increase in oil company taxes now sought.

4. Small companies and operators

who depend on percentage depletion to recoup capital lost on unsuccessful ventures would be forced out of business.

5. Employment would necessarily drop off, not only in oil and related industry, such as oil field supply dealers and drilling contractors, but also in industries such as the automobile and chemical industries, because of the curtailed operations of the oil industry and the high prices of its products.

6. The whole national income and general economy of the nation would be affected in ways that cannot now even be foreseen. In the end government tax revenues probably would not be increased but even might be seriously decreased, and the consumers would have to pay the bill.

Hardey's view.—Reduction of the allowance for depletion will tend to drive out of business many small operators, increasing concentration and the likelihood of monopoly, and would reduce the number of new operators attracted into the business, it was held by B. A. Hardey, independent producer of Shreveport, La.

If the Treasury proposal to lower the rate is based on the theory that if adverse consequences develop or an emergency arises the incentive to discover new reserves can be restored quickly by again raising it, Hardey said, that is a "completely fallacious" argument because of the long-term nature of the oil industry.

"An error in decision now could have a crucial effect in case of war within the next 5 or 10 years," he emphasized. "If Congress once reduces the present incentive for oil exploration and development there will always be the fear that such action may be taken again, so that even if the rate were restored it would provide less incentive than if the present one is continued."

Last member of the industry committee to testify was J. P. Jones, president of the National Stripper Well Association, who asserted that 8 billion barrels of reserve underlying the stripper wells of the country will be produced "only if the incentive is there to encourage the operator to risk his capital."

It is only through depletion or more productive leases that the marginal properties can be saved and developed for secondary recovery operations, Jones said, and, so far as the Treasury's assertions that the allowance does not benefit the small operator are concerned, he told the committee, "the small operator is making a profit or he wouldn't be in business."

But, he added, "the proposed recommendation of the Treasury Department jeopardizes the only fund available that will enable him to continue his operation and expand his activity if he is to stay in business."

Sterling Puzzle

Washington officials still not clear about Britain's plan to save dollars by squeezing United States oil companies

Bertram F. Linz

WASHINGTON.—United States officials were still trying this week to secure some clarification of British proposals with respect to the operations of American oil companies in the sterling area and so-called "third countries" — those outside the sterling area which, however, buy oil for sterling.

The top officials of the companies affected by the British order designed to substitute sterling for dollar fuel oil and, in part, gasoline, have discussed the proposals with State Department officials and with members of the British delegation to the Anglo-American oil talks, making it known to the former at least that they definitely object to the whole plan laid down by Britain.

While there has been no official information, it is reported that most of the larger companies which operate in the sterling area have made arrangements to buy sterling oil, through very-short-term contracts they could get out from under quickly in the event the order is modified, so that they can meet their commitments.

A catch in it.—The British delegation offered to promise that the curtailment of 4,000,000 tons per year (approximately 80,000 bbl. per day) in the sales of American companies would not be increased prior to June 30, 1952, provided there is no interruption or diminution of the flow of ECA funds to Britain and no strings on that country's oil operations.

While the United States is not prepared to agree to either the 4,000,000-ton cut or the commitment to continue to support Britain with Marshall-plan money, those points have become overshadowed by the uncertainty as to how the American companies are to operate under the British plan.

One point of importance which the British delegation will be asked to clarify concerns the steps to be taken by American companies to secure equal treatment with British companies. In order to become "resident," the companies would have to have resident managers and directors and would be subject to full British control and the payment of British income taxes. This control would be so complete that the companies would have little freedom to make major decisions and would not be able to convert their earnings into dollars, it is said.

The point that is not clear is whether these requirements would be limited to the companies in Britain or would extend back to the production of oil outside the United States or oil going into the sterling area.

Another point concerns the sale of dollar oil for sterling in third countries, with which the British have been interfering, and the use or conversion of such sterling. The British-controlled companies are permitted to do business in those areas and to use the sterling derived from oil sales. A case in point is that of Argentina which, under a bilateral trade agreement entered into last year, sells meat to England for sterling which it uses to buy oil, but is required to limit its purchases to so-called sterling oil and the American companies are frozen out of the market.

Congress interested.—The whole situation may be aired at the Capitol this week when the oil group of the House interstate commerce committee, under Rep. Oren Harris of Arkansas, opens hearings at which Oil and Gas Division officials will be the first witnesses.

These hearings, opening February 16, will be the first of a series designed to explore all oil problems, and Harris has indicated his intention of going deeply into the sterling-dollar oil controversy.

The same subject is also due to be investigated within the next few weeks by a House small business subcommittee under Rep. Eugene J. Keogh of New York, and was discussed in the Senate at length last week by Sen. George W. Malone of Nevada.

Companies wary.—In their discussion with government officials, company executives expressed "strong reservations" regarding the British proposals, it was disclosed at the State Department following the conference.

This week the company men conferred individually with British officials in this country for further talks, at which they pressed the view that arrangements can be made which will meet Britain's necessity to save dollar exchange and at the same time enable the companies to operate in the sterling and other areas without undue restrictions.

Meeting with officials in these talks were representatives of Socony-Vacuum Oil Co., Inc., Standard Oil Co. (N. J.), Gulf Oil Corp., Atlantic Refining Co., Arabian American Oil Co., The Texas Co., California-Texas Oil Co., American Independent Oil Co.,

Standard Oil Co. of California, and Standard-Vacuum Oil Co.

They emphasized that all British company oil has a substantial dollar cost and that this fact must not be lost sight of in considering adjustments which the American companies may be required to make in order to avoid displacement by sterling oil, State Department officials said.

"They did not consider that the British proposals took sufficient account of this fact," they added.

The company officials also expressed the view that the British proposals were directed solely to the problem of exchange saving, without allowance for other important considerations, but in view of the need of reducing the dollar drain on the sterling area, they expressed a willingness to cooperate with the British Government in devising arrangements "whereby United States companies can make the maximum contribution to this objective through adjustments in their operations," a department statement explained.

Britain's Oil Offer

Official memorandum explains "substitution" policy for displacing dollar oil, outlines "incentives" for oil companies

Dahl M. Duff

NEW YORK.—The British Government memorandum submitted last week in the sterling-dollar oil discussion offers in general terms the framework of a plan under which the American oil companies could trade in sterling to the extent they could utilize it.

The document was submitted February 8 through the State Department to the affected American oil companies. It sets forth in some detail the justification of the British action in curtailing sterling-area imports of dollar oil and its final pages outlines the so-called incentive scheme.

The purpose of this is to cause the American companies to reduce the dollar component in their costs. These companies would have their currency-trading problems relieved to the extent that they substituted sterling for dollars in their operating expenditures.

Initial reception to the memorandum was somewhat cool. However, it was generally considered to be a basis on which some kind of compromise arrangement could be reached. In view of this, there was continued optimism among various oil-company officials.

No specific details were given in the outline of the incentive plan. The memorandum pointed out that problems of each company differed, and that the actual technique of the plan would have to be worked out in negotiations with the companies.

"Substitution" policy.—In their memorandum, the British agreed to limit the "substitution" policy to a total of 4,000,000 tons a year of refined products. It was the announcement of this policy December 17 that brought the dollar-sterling oil problem to a head. Under it, the British decided to substitute available sterling-oil products for dollar-oil imports into the sterling area.

This 4,000,000-ton limit was given to hold for the life of the Marshall plan, and the course to be followed after that was not set out. It said that final substitution figures would be decided and furnished to the U. S. Government at least 3 months before the end of each year and that no increases would thereafter be made in sterling oil substituted.

For 1950, the memorandum gave the following figures on products to be supplied from sterling sources under the substitution policy:

	Tons
Motor fuel	750,000
Kerosine	150,000
Gas or diesel oil	500,000
Fuel oil	2,400,000
Total	3,800,000

This total is equivalent to about 75,000 bbl. daily. This means that the sterling-area market for American-controlled production will be reduced this year from about 13,000,000 tons to slightly over 9,000,000 tons (approximately 180,000 bbl. per day).

The necessity for reducing the dollar drain on British resources was cited frequently in the memorandum. It made clear that any scheme accepted for the relief of the American companies must not cause any loss of dollars to the British economy.

Policy defended.—The substitution policy was defended in the following words:

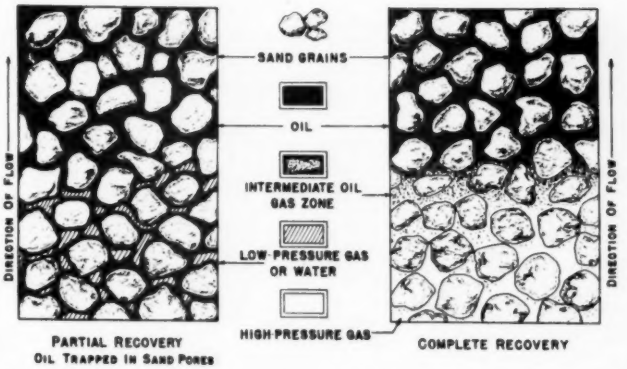
"The objective of our substitution policy is to secure the maximum dollar savings on oil imported into the sterling area by drawing supplies from sources which, irrespective of ownership, involve us in the lower dollar cost.

"It is the essence of this policy that we are substituting British companies' oil, not because it is British but because it saves us dollars and that we are using the British companies' surplus for this purpose because our present and prospective dollar difficulties demand at least this contribution to dollar savings from oil.

"Our aim is not to provide an expanding or protected market inside the sterling area for the products of British-controlled companies as such. The use of British surpluses, which have only recently become available, offers a prospect of dollar saving both substantial and immediate.

"If a better way can be found to

MAGNIFIED SECTION OF OIL-BEARING SAND SHOWING PARTIAL VS. COMPLETE RECOVERY



ATLANTIC'S TEASER.—This diagram is all that Atlantic Refining Co. has released since its original announcement, printed in The Oil and Gas Journal February 2, that it has developed a new crude-production method based on injection of gas under extremely high pressures. The company claims that its laboratory studies revealed hitherto unknown principles of gas-oil solution and reservoir behavior which will permit recovery of 90 per cent of the oil in place, but so far it has revealed no technical or engineering details.

achieve the same results, and as rapidly, we are ready to consider sympathetically all suggestions."

Crude unaffected.—The memorandum said that the British Government by its substitution policy does not propose to disturb any of the existing arrangements for the sale of crude oil by American-controlled companies to British-controlled companies or to the sterling area. Any extension of these arrangements, however, "will have to be looked at on their merits." It was estimated the dollar cost of such crude to the British would be about $100,000,000 in 1950 and $150,000,000 in 1953.

Discussing the surpluses of refined products which make substitution possible, the British said that the character of these surpluses would change from year to year. In particular, it is likely that the surplus of heavy fuel oil will become one of gasoline after 1950.

The memorandum said it was not the intention to freeze the volume of imports from American-controlled sources at the levels fixed by the substitution policy. The United States companies would be permitted to share in the expanding sterling-area and United Kingdom market provided the dollar content of their production was diminished by significant net expenditures in the sterling area.

No mention was made in the memorandum of any maximum limit of dollar profit withdrawals by American companies which might go on a sterling basis. Nor was any proposal advanced under which the British would, as previously rumored, take over the concessions held by the American companies.

The American companies have indicated they would incorporate companies in the United Kingdom subject to British law and taxation to gain the same currency rights as the British companies now have. The memorandum, however, limited such action to cover oil actually produced and refined in the sterling area.

Incentive plan.—In discussing the incentive plan, the British made what appeared to be a considerable concession in that American companies utilizing current sterling income would be given the same priorities as the British oil companies. This is of importance since the British equipment industry, though expanding, is limited in its capacity.

Investments in the United Kingdom itself would not be permitted under the incentive plan to utilize sterling, nor would the accumulation of sterling balances be permitted. The memorandum mentioned "equipment, stores, and services" as the usual sterling expenditures. It admitted there would be some difficulty in determining a base for sterling expenditures above which further expenditure would be presumably credited

WATCHING WASHINGTON

Bertram F. Linz

Crime Doesn't Pay—Much

If any oil men want to do it at bargain rates, now is the time to violate the antitrust laws.

For a mere $5,000 per, possibly less, they can clear any violations of which the courts find them guilty in civil suits brought by the Department of Justice, but legislation now being perfected by the House judiciary committee seeks to make it ten times as expensive to knock a competitor on the head.

Both the Department of Justice and the Federal Trade Commission are heartily in favor of the idea of milking monopolies for real money instead of slapping them on the wrist, on the basis of the theory expounded in the Gilbert and Sullivan opera that the punishment should fit the crime.

In fact, James W. Cassidy, associate general counsel of the FTC, would go still further, and proposed to the committee that antitrust fines be based on a percentage scale related to corporate income—a sort of an income tax for evil-doers.

That looks like a good idea that should be incorporated in the new tax bill as an offset against the loss of revenue from the modification of excise taxes instead of a plug in that mythical loophole, the depletion allowance.

It sort of exemplifies Uncle Sam's split personality. As enforcer of the law he is against crime; as tax collector he doesn't care how you get your money so long as you split with him, and you can gamble, steal, or forge without exciting the Bureau of Internal Revenue so long as it gets its cut.

A-Bomb Defense

Any oil company wanting to build an atom-bomb-proof plant can get some over-all suggestions from the National Security Resources Board, which has just put its ideas on the subject together in a report.

The general formula for a multistory reinforced concrete or steel-frame building, purely tentative in view of the possibility that the H-bomb may put the A-bomb in the cap-pistol class, is quite simple.

"It is suggested," the report states, "that the designer assume a horizontal wind component of 90 lb. per square foot and a vertical component of 70 lb. per square foot for protection against structural collapse from an atomic bomb releasing energy equivalent to 20,000 tons of TNT, exploding at a horizontal distance of ½ mile and a height of approximately 2,000 ft. It is also suggested that buildings and their component parts be designed employing the methods, allowable stresses, and details employed in wind or earthquake-resistant design."

That sounds like a good formula—but do the Russians understand that they must bust their bombs a half-mile away or be considered off-side?

Depletion Dickerings

Judging by the tenor of questions asked by ways and means committee members of witnesses at the depletion hearing, the administration program for a double reduction in the depletion allowance isn't going through without a stiff fight, although it is possible some changes may be made in the provisions.

Eleven of the 15 Democrats and 6 of the 10 Republicans on the committee are from oil-producing states, and while a number of the former are expected to tag along with the administration enough of them have expressed opposition to any change in the depletion rate to forestall action if they can get all the minority members to join them.

Even if the Treasury proposals cannot be stopped in their tracks, it is generally expected the committee will not cut the rate to 15 per cent but more likely will adopt a figure somewhere between that and the present 27½ per cent. But many members of the committee, on both sides of the political fence, freely predict there will be no reduction whatever.

It has been informally suggested that the allowance might be limited to the original operators, that is, not transferred to the purchaser of a well as it is now, but it is admitted that this would involve serious difficulties.

Another suggestion would be aimed at keeping "outsiders" from benefiting from the depletion allowance by requiring that where a taxpayer in another business also engages in oil operations the two shall be kept separate.

The committee, so far, appears to have paid little attention to the Treasury's recommendations that deductions for intangible costs be applied against depletion allowance, and present indications are that nothing will be done along that line.

against additional imports into the sterling area.

In effect, the plan visualized was one where the American companies would continue to sell for dollars but that an increasing proportion of these would flow back into the sterling area through increasing expenditures.

The British said that fundamentally the problem of American-company sales outside the sterling area was not for them to solve. American companies contend their nonsterling markets have been reduced by the British bilateral trade agreements, of which the memorandum made no mention.

The British proposal indicated that sales for sterling in these nonsterling-area countries would be permitted with limitations on use of the sterling and that the British Government would provide soft currencies against dollars for purchases outside the sterling area which would reduce the dollar content of the American-controlled oil.

Gas-Company Controls

Industry makes strong attack against proposed bill which would give F P C power to regulate financial activities

WASHINGTON.—Legislation amending the Natural Gas Act to provide financial controls over gas companies was strongly opposed before a House interstate-commerce subcommittee last week by the oil and natural-gas interests.

The bill would give the Federal Power Commission authority to regulate the issuance of securities by natural-gas companies not subject now to the authority of the Securities and Exchange Commission or the state regulatory bodies.

Oil and gas spokesmen told the subcommittee the measure, introduced by Rep. Robert Crosser of Ohio, was undesirable at best but particularly so at the present time in view of the uncertainty regarding the commission's authority over independent producers and gatherers.

No danger yet.—The bill was supported by the FPC and SEC, with FPC Chairman Nelson Lee Smith explaining that it is designed to fill "a serious gap in the regulation of interstate natural-gas pipe-line companies."

Smith hastened to assure the subcommittee that there is no suggestion that the natural-gas industry as a whole is now in anything but a very healthy financial condition and is soundly managed, but it is prudent to recognize, he said, that without effective securities regulation "there are possibilities of unsound practices leading to serious public detriment."

Pointing to the electric utility debacle of the early 30's as an example of what can result from the failure to enact preventive legislation, Smith said the bill would "lock the stable door before the horse left."

I.P.A.A. presents case. — Submitting the views of the Independent Petroleum Association of America, L. Dan Jones, attorney, explained that while the bill applies to natural-gas companies and therefore it might be assumed would not affect producers and gatherers, "in view of the confused status of producers and gatherers in regard to FPC authority we are concerned as to the manner in which the bill will affect them."

"If the commission is left free to classify producers and gatherers as natural-gas companies then the Crosser bill would apply to them as well as to the interstate transporters of natural gas," he said.

Jones pointed out that for years the FPC has threatened to assert jurisdiction over production and gathering despite the clear intent of Congress to exempt those activities from the Natural Gas Act. That threat is even more imminent than in the past, as a result of two recent developments—the Supreme Court decision in the East Ohio Gas Co. case and the commission's reversal of its Order 139, adopted in August 1947, when Congress was considering amendment of the act and giving assurance that the commission would not assert jurisdiction over arm's-length sales of gas.

"Because of these recent developments we feel that it is more urgent than ever before that the jurisdictional status of producers and gatherers under the Natural Gas Act be clarified by legislation," Jones said. "As this committee knows, the House has passed the Harris bill which is aimed to this end. Action on a similar bill is now pending in the Senate. In addition, there are several other bills now pending in Congress proposing amendments to the Natural Gas Act in various respects. In view of this situation we urge that no action be taken on the Crosser bill until the status of the producers and gatherers is clearly defined by an act of Congress and that it is clear just who is subject to the bill. In our opinion enactment of the Crosser bill would present a further threat to producers and gatherers of gas."

Aside from these considerations, however, Jones pointed out several objections to the provisions of the bill, one the failure to define the term "security" and thus making the bill cover both public and private financing.

Another objection voiced by the I.P.A.A. spokesman had to do with the elements that would be involved in FPC proceedings—the delay, which is inconsistent with the normal fast-pace operations of the oil and gas business; the divulging of information which often would nullify or destroy the value of the business venture; and the adverse effect on marketing outlets by hampering the freedom of operations.

Government Leases Offered

WASHINGTON. — The Bureau of Land Management will open bids March 8 for oil and gas leases on some 1,500 acres of Government lands comprising the Cactus Ordnance Works military reservation at Etter, Tex., and on April 12 will open bids on more than 1,000 acres of land in the Osage field, 12 miles northwest of Newcastle, Wyo.

The Cactus reservation lands will be offered in 6 parcels ranging from 54 to 450 acres, and will be leased to the bidders of the highest cash bonuses and the regular advance rental fee of $1 an acre with a royalty of 12½ per cent.

The Osage field land will be offered in 9 parcels of 40 to 160 acres to bidders of the highest bonus at royalties ranging from 12½ to 25 per cent for oil and 12½ to 16⅔ per cent for gas.

Record Imports

Total reaches 794,000 bbl. daily; crude drops slightly

DECEMBER imports of crude and products for consumption were the highest on record.

Imports at all continental United States ports averaged 794,000 bbl. daily, according to tabulations of the Department of Commerce. This represents an increase of 72,600 bbl. daily over November and is 15,600 bbl. daily greater than the previous record set in October.

Heavy fuel accounted for the increase. Residual imports averaged 324,000 bbl. daily to set an all-time record with increases of 35 per cent over November and 23 per cent over the previous record set in October. The December average was almost twice the average for the first half of the year. Imports of other products, including topped crude, decreased from 25,000 bbl. daily in November to 19,000 bbl. daily in December.

Daily average crude imports decreased 5,500 bbl. to 451,000 bbl. for the month. Major changes in receipts by country of origin were decreases for Kuwait and Colombia offset by a gain for Venezuela. Insignificant gains were recorded for Mexico and Saudi Arabia. East Coast refineries

received 96 per cent of all crude imported during the month.

Exports from continental United States, excluding shipments to territories, averaged 238,000 bbl. daily in December compared with 253,600 bbl. daily in November and 276,000 bbl. daily in October. A normal seasonal decline was reported for crude.

Gasoline exports decreased about 200,000 bbl. for the month, mostly in finished motor fuel since natural gasoline shipments were up 234,000 bbl. over the very low month of November. On the other hand, lube-oil exports were higher than in any month since last May.

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	Dec. 1949	Nov. 1949
Crude—		
Mexico	592	459
Colombia	1,031	1,328
Venezuela	9,653	8,193
Kuwait	1,984	3,002
Saudi Arabia	723	627
Other		89
Total crude	13,983	13,698
Barrels daily	451,065	456,620
Products—		
Residual fuel	10,057	7,218
Other products	584	736
Total products	10,641	7,954
Barrels daily	343,258	265,121
Total all oils	24,624	21,652
Barrels daily	794,323	721,741

EXPORTS*

	Dec 1949	Nov. 1949
Crude	2,722	3,010
Gasoline	1,605	1,804
Lube oils	1,296	756
Other products	1,759	2,038
Total all oils	7,382	7,608
Barrels daily	238,129	253,609

*Does not include shipments to territories, which in past months have averaged 30,000 to 40,000 bbl. daily.

ECONOMICS

Firm Crude-Oil Prices

Net increase of 5 per cent in total demand, with increase in domestic output of 4 per cent, forecast for this year

Dahl M. Duff

BOSTON. — Crude-oil prices could drop, but at this time more factors seem to favor their holding at present levels.

Oil-company sales will increase something like 350,000 bbl. daily domestically in 1950, exports will fall off, and net increase of 5 per cent in total demand can be reasonably expected.

These predictions were made last week in a speech here by A. J. McIntosh, economist, Socony-Vacuum Oil Co., Inc., New York, before the Security Analysts Society of Boston.

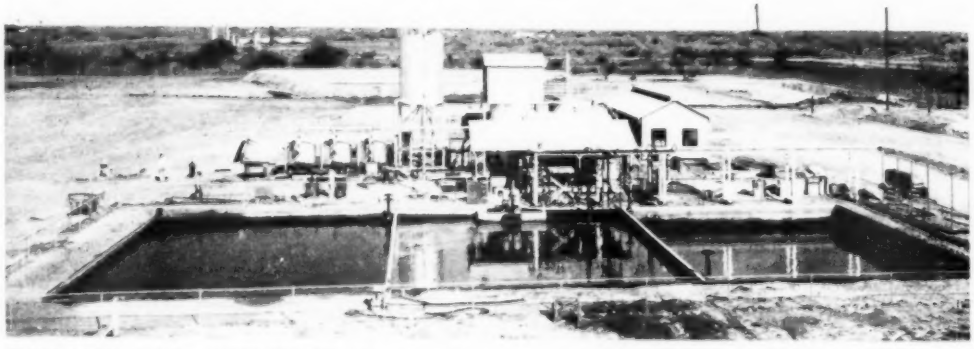
Discussing current trends and the outlook in the petroleum industry in 1950, McIntosh said that a year ago he had thought the crude price might drop but that since then several difficult adjustments had been made in the industry.

Crude-price factors. — "There was practically no net change in inventory levels during 1949, while in 1948 stocks were piling up almost 300,000 bbl. daily," he said. "That's also good. Demand appears to be on the increase after some adjustments and hesitations. Imports may slow up somewhat, and crude production in the United States may have to increase about 4 per cent over 1949 to take care of 1950 requirements. These factors all favor maintenance of firm crude-oil prices.

"On the other side, the present high price may be resulting in too much exploration for present requirements. We may have added another 1.2 billion barrels of reserves last year. . . . If that is the figure, we found enough in 1949 at that rate to give us a production of about 275,000 bbl. daily for 12 years. I don't think we need quite that much additional new oil in 1950. So we may find our new discoveries running somewhat on the high side. High crude prices tend to keep them that large. That's a threat to prices staying where they are."

McIntosh pointed out some decreased drilling occurred last year in California and the Rocky Mountain states, and a fairly large drop occurred in Pennsylvania and adjacent areas. He said the curtailment in Pennsylvania was tied into the disparity between crude-oil and lubricating-oil prices. "It is quite significant that these declines were in areas where imports probably were an unimportant factor," he commented.

Product demand.—In discussing probable demand increases in 1950, the



PLANT TO TREAT PLANT WASTE WATERS.—This new and unusual waste water treater and disposal unit is adjacent to the huge Seeligson gasoline plant (capacity 500,000 gal. per day), operated by Magnolia Petroleum Co. in Seeligson field, Jim Wells County, Texas. Up to 5,000 bbl. of plant waste water can be treated per day, then disposed of via two injection wells. The big gasoline plant operation had some fairly troublesome waters (high salt content, sodium chloride and sodium sulfate) to get rid of. These came from the cooling tower blowdown, the boilers blowdown, from hydrogen ion exchangers (regeneration waste), and the gas coolers. The waste water to be treated is processed in these steps: First, coagulation; using ferrous sulfate and activated silica. This is followed by chlorination for sterilization, to prevent growth of sulfate-splitting organisms and also prevent formation of gelatinous substances on sand face in injection wells. The water then is pumped to three pressure-type rapid sand filters. It gets a CO_2 dosage for pH control before passing to the injection wells.

Socony-Vacuum economist gave the following forecasts by products:

Gasoline—Four per cent increase.

Kerosine—"A most difficult product to judge right now—say 6 per cent or better."

Home-heating oils, diesels, and other light fuels—"Considerably higher at 14 per cent partly because of the warm weather of 1949."

Heavy industrial fuel oils—"May show a 2 per cent drop, or may increase that much."

Other products, McIntosh said, should follow the above trend of the major products. He pointed out that if 1950 weather is just normal, the petroleum industry will have a gain of at least 1½ per cent without any new customers.

"So you see we are pretty conservative when we say an increase of 5 to 6 per cent in total domestic demand because that includes the 1½ per cent adjustment for weather," he said. "After allowing for a decline in exports, the over-all increase may be within a half percentage of the above."

General.—The general condition of the industry, he said, "looks pretty good." He remarked that the squeeze on some refiners is "not a healthy condition." On the producing side, he said, half the loss in production in 1940 as compared to 1948 was due to the elimination of overproduction, or production for stock building not needed last year. Warm weather also hurt the producer, and probably was the cause of 15 per cent of the decline in his crude requirements, McIntosh said.

"Employment was maintained generally over the year," he said. "Reserves found and assets created were probably better than average. Certainly that was true for Socony-Vacuum. We had the best year in our entire history, gaged by oil discoveries."

Oil vs. Coal

Electric utilities register record use of residual fuel

John C. Casper

FUEL oil is taking more and more of the electric-utilities market away from coal.

Lower fuel-oil prices and the uncertainty of the coal supply have been responsible for the big shift.

Consumption of light and heavy fuel oils by utility power plants reached the all-time high of 7,938,496 bbl. in December 1949, according to data compiled by the Federal Power Commission. This December record represents an increase of 83.2 per cent over December 1948 and is 8.5 per cent above the previous record set last November.

Total fuel-oil requirements in 1949 amounted to 66,302,548 bbl., an increase of 55.5 per cent over 1948. Gas consumption was up 15 per cent to 549,888,635,000 cu. ft. for the year. In contrast, these plants burned 15.6 per cent less coal than in 1948.

Residual fuel accounted for about 90 per cent of total fuel oil used and for all of the increase over 1948. Since plants using diesel power cannot shift from one fuel to another, the distillate-diesel fuel consumption was about the same as in 1948. Many steam plants are equipped to burn either coal or heavy fuel oil and can change fuels to take advantage of price differentials or shifts in supply.

Residual fuel prices were off almost 40 per cent in 1949 compared with 1948. The average of the weekly "lows" of barge prices in New York Harbor for 1948 was $3.00 per barrel compared with an average of $1.37 in 1949. Since fuel cost is a major expense item, this drop in fuel-oil price was an influencing factor in many of the decisions to convert from coal to heavy fuel.

However, not all of the increase can be credited to lower residual prices. A large part of the gain came in the last half of the year after fuel-oil prices had passed the low point and started to rise.

The "low" of the New York barge price was $1.60 a barrel in July compared with $2.05 in December. The uncertainty of the coal supply forced additional conversions to heavy fuel to bring consumption in the last quarter up to almost one-third of the total for the year.

Future Competition?

Two-dollar oil in Alberta would mean competition for West Texas oil in Great Lakes marketing area, study indicates

Charles J. Deegan

CANADIAN crude oil can compete with West Texas crude at Great Lakes refining centers if the field price in Alberta drops to 35 or 45 cents per barrel below the West Texas price.

This is indicated by a study of pipeline tariffs and probable charges for hauling crude oil in tankers on the Great Lakes.

Disclosure that "many Alberta oil men are figuring '2-dollar oil' as the probable average for the province's light-crude fields on the long-term basis" was made in Chicago last week by Carl O. Nickle, prominent Calgary oil writer *(The Oil and Gas Journal, February 9, page 46)*. The speaker did not say whether he meant Canadian or United States currency, but rough calculations indicate that with a field price equivalent to $2 (U. S.) per barrel, Alberta crude could pay the present United States import tax of 10½ cents per barrel and compete with West Texas crude reaching the Great Lakes at present published pipe-line charges.

The results of these calculations are shown in Table 1, which gives the estimated cost of crude of 36° gravity laid down at typical Great Lakes ports. This estimate considers only major transportation costs and the present import duty. Gathering, terminal, handling, and other charges are considered to be about the same for either crude, and are excluded to simplify comparisons. Field price basis is $2.44 per barrel for West Texas and $2 for Alberta.

TABLE 1

Estimated cost at	From West Texas	From Alberta
Chicago	$2.84	$2.85
Toledo	2.96	2.95
Cleveland	3.00	2.95
Buffalo	3.04	3.00

Interprovincial Pipe Line Co., which is building a crude line from Edmonton, Alta., to Superior, Wis., has announced a tentative tariff of 55 cents per barrel for this movement. The line is scheduled to go into operation in the spring of 1951 and will be operated as a common carrier. Imperial Oil, Ltd., has agreed to use the line's initial capacity for moving crude to refineries in Sarnia, Ont., but the line could easily be enlarged to accommodate other shippers.

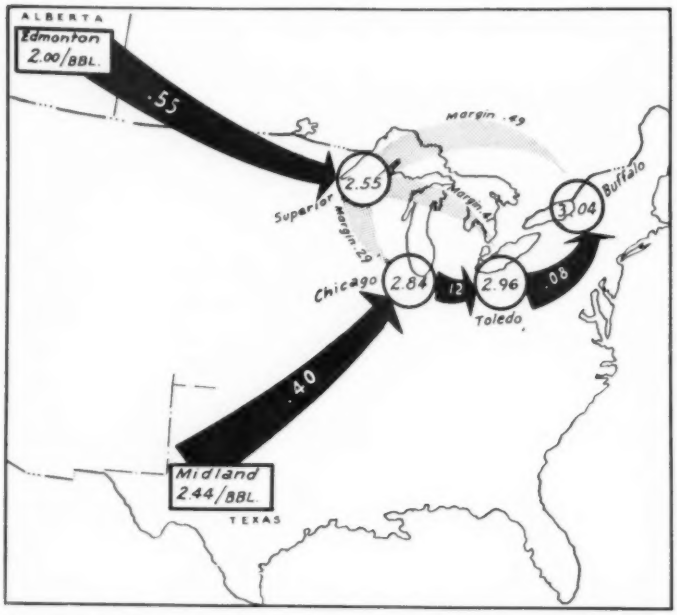
The largest item of uncertainty in figuring delivered costs of Alberta crude is the Great Lakes tanker charge from Superior south and east. Prevailing lake tanker rates are chiefly for refined products. Large, modern crude tankers, such as Imperial is building for its Sarnia movement, should have unit costs below current products rates. However, comparisons with ocean tanker rates for similar distances are difficult because the lakes are closed to navigation about 150 days per year.

Considering these factors, estimates of probable costs of moving crude from Superior by lake tanker are 20 cents per barrel to Chicago, 30 cents to Toledo, Cleveland, and Toronto, 35 cents to Buffalo, and 60 cents to Montreal.

Present published pipe-line tariffs for moving crude from West Texas to Great Lakes ports are: 40 cents per barrel to Chicago, 52 cents to Toledo, 56 cents to Cleveland (partly estimated), and 60 cents to Buffalo.

Adding the various known and estimated costs gives the rounded figures used in Table 1.

From all of the above estimates, it seems likely that at $2.00 (U. S.) per barrel at the well in Alberta, Canadian oil is just about at the competitive point with 36°-gravity West



Competitive conditions in Great Lakes markets for 36° Alberta crude at $2.00 (U. S.) per bbl. vs. West Texas crude at current market. Solid arrows show pipe-line tariffs. Shaded arrows from Canadian terminal show margin within which Canadian crude must absorb 10½-cent tariff and tanker costs to compete with West Texas crude at that U. S. delivery point.

Texas crude at $2.44 per barrel, at Great Lakes refining centers. Considering the tariff at 10 cents per barrel (actually 10½ cents), $2.00 (U. S.) Canadian oil at the well equals $2.10 (U. S.). That gives the Canadian oil an advantage of 34 cents per barrel at the well, with which to overcome greater transportation costs.

West Texas crude is used as the basis of comparison because that is the great area of surplus production and future reserves in the United States, which must move outward to competitive markets.

The figures presented here are not all exact. But they are close enough to indicate where pencil sharpening and shaving of costs and rates must begin. Canadian crude at field prices around 35 to 45 cents below West Texas field prices can compete in the United States Great Lakes refining centers.

Western Canadian crude prices at the well are now in an intermediate stage. They were, prior to the big discoveries, at a price that reflected high transportation costs of crude brought in to supplement the local supply. To compete in distant markets, they must eventually drop to a level that will permit the local Alberta price plus transportation costs to give a laid-down price in the Great Lakes crude-oil markets that is competitive with other crudes. It would appear that the $2.00 (U. S.) per barrel price in Alberta is rather close to that level.

MIDWEST

Texas Gas in Ohio

MIDDLETOWN, Ohio.—First deliveries of natural gas were made here last week through the new 800-mile Texas pipe line of Texas Gas Transmission Corp.

The gas was delivered through the recently completed line into the Big Inch system of Texas Eastern Transmission Corp. which will distribute the gas to utilities serving cities in Ohio, Pennsylvania, and upper New York state.

Texas Gas Transmission, Owensboro, Ky., has a contract calling for the delivery later this year of up to 235,000,000 cu. ft. of gas daily through the $73,500,000 line from Texas to Middletown.

Full capacity of the Texas Gas Transmission line is about 400,000,000 cu. ft. daily. It went into preliminary operation last December as far as Louisville, Ky., and also has been supplying additional gas to existing customers along the route. These include the cities of Greenville and Shelby, Miss.; Memphis, Tenn.; Owensboro, Bowling Green, Franklin, and Madisonville, Ky.; and Evansville, Vincennes, Bloomington, and Columbus, Ind. Louisville, now receiving 20,000,000 cu. ft. daily from Texas Gas Transmission, will get up to 30,000,000 cu. ft. during the second year of the line's operation and 40,000,000 cu. ft. daily thereafter.

Full operation of the new line will give Texas Gas Transmission a daily delivery capacity of more than 600,000,000 cu. ft. daily throughout its entire system of some 2,400 miles.

SOUTHWEST

Texas Tax Bills

Special session gets three bills to boost tax revenue

AUSTIN.—Three bills which would levy heavy additional taxes on the Texas oil and gas industry have been introduced in the special session of the legislature.

Two of the three bills have been approved by the revenue and taxation committee of the House. One is the administration-approved bill to increase the 1941 omnibus tax bill by 10 per cent across the board. Severance taxes on oil and gas are included in this bill. In 1948, the two natural resources brought tax income of around $96,000,000.

On this basis, a 10 per cent increase in rates would result in almost $10,000,000 of additional taxes on the industry. However, the state's oil production has declined during the past year so the amount may not be this high.

The second bill approved by the House committee would levy a new tax on natural gas, which, it is estimated, would bring in $30,000,000 a year. The tax is based on a graduated levy which would start at 1 cent per thousand cubic feet. Similar gas tax bills have been defeated in the past two regular sessions.

The third bill of interest to the industry is another gas tax bill which has been introduced in the House. It would put a flat 1 cent occupation tax on each thousand cubic feet of natural gas gathered, would exempt no gas, and would produce an estimated $30,000,000.

The current special session was called by Gov. Allan Shivers for the purpose of raising money for state hospitals and special schools. Expected revenues have decreased $48,000,000 during the last year, he reported. As a result, the state comptroller says there will be a deficit of $26,000,000 by August 31, 1951. Cuts in the state's allowable production of crude oil have been largely responsible for the reduced income.

Imports Committee Named

AUSTIN. — A 100 - member citizen committee to seek a solution to the oil-import problem has been named by Railroad Commission Chairman William J. Murray, Jr.

Murray said he had tried to select a fair and impartial representation of Texas citizens, and called on the committee to conduct its own investigation and arrive at a course of action in the best interests of both Texas and the nation. Some time ago Murray announced he would appoint the committee after increases in crude-oil imports continued to require monthly cutbacks in Texas oil production to avoid waste.

"I think there can be no question," Murray said, "about the economic and military necessity for a strong and healthy domestic petroleum industry. Any factors of whatever nature tending to undermine this objective pervade our entire economy and endanger our security as a nation."

E. J. McCurdy, Fort Worth, and T. S. Painter, president of the University of Texas, are cochairmen of the committee.

Production Problem

Texas Railroad Commission faces decision on whether to keep MER as basis for setting production allowables

D. H. Stormont

DALLAS.—A discussion of methods of allocating production between fields may overshadow the usual testimony of purchasers as to how much crude oil they desire to take from Texas fields at the statewide oil-proration hearing to be held in San Antonio February 17.

The question likely to be debated is: "Should the Railroad Commission abandon the MER (most efficient rate) basis of allocating oil production between fields?" Its chairman, William J. Murray, Jr., recently stated he believes the time now has come for the method to be abandoned, or supplemented, since it was instituted during war years as the basis for arriving at "maximum" efficient rates of production.

The MER basis could be retained as a ceiling for production in individual fields, he stated, but not as a basis for proration. He added that testimony on the proposed change likely would be received at the hearing.

If such testimony is taken it is expected that vigorous opposition to the proposed change will be offered by many company representatives. Some proration engineers point out that while the MER basis is not designed primarily as a proration tool, it does take into account the ability of an oil reservoir to produce; that it considers physical waste caused by high gas-oil or water-oil ratios, decline in reservoir pressures because of too rapid volumetric withdrawals, and other factors.

They feel it is far better than a method based solely on market demand, depth, and acreage, such as was used before the war. They do not favor returning to such a basis of allocation, or proration, pointing to the endless trouble and law suits which its use occasioned.

Operators afraid. — Operators with production largely in the sour-oil fields of West Texas are afraid that abandonment of the MER basis will result in their allowables being cut. While these sour crudes were satisfactory and in demand during times of a crude-oil shortage, with the return of an oversupply of oil many purchasers have been asking that the allowables be reduced.

Murray's proposal is caused primarily by the rapid rise of production in Scurry County and the desire of East Texas operators for higher allowables. Scurry reef producers currently have an allowable of 200 bbl. daily (120 on a calendar-day basis) while East Texas wells have one of only 20 bbl., or less than 10 bbl. on a calendar-day basis. Thus East Texans, and others, are contending that Scurry producers are taking a larger share of the total allowable than they deserve. They would like to see Scurry allowables cut. Since the commission's evidence is to the effect that 220 bbl. is not too much for these reef wells, many of which have over 400 ft. of net producing section, it would be out of line with the MER basis to cut their production below that figure.

Insofar as allowable production is concerned during March, the purchasers' testimony is expected to be along the line that present flow rates should be continued. The nearest approach to this would be for the Railroad Commission to issue a schedule which would call for 16 producing days. The East Texas field, which generally during the past year has been allowed two producing days less than the remainder of the state, probably will be placed on the same level of the other fields. Two commission members, Gen. E. O. Thompson and Olin Culberson, have stated they favored such action.

Issuance of such a 16-day order would result in a higher calendar-day rate of production because of the following reasons: In addition to the added production from East Texas, resulting from its being placed on parity with other flush fields, the added flow of new wells completed during the past month will further increase the oil which must be allocated. Also, the commission recently revised the proration schedule to eliminate as much under-production as possible.

GULF COAST

Tidelands Revival

Bill giving title to states to find strong opposition

WASHINGTON.—The tidelands issue was suddenly revived last week. A House judiciary subcommittee approved legislation which would give the coastal oil states full ownership of their marginal waters and 50 per cent of the income from oil and other development in the federally owned Continental Shelf.

While the subcommittee's action indicated the states have gone on the offensive in an effort to get a settlement of the controversy, there was no anticipation in Washington that the bill would be passed by Congress, much less approved by the President or made law over his veto.

No compromise.—There was nothing in the situation, either, to support rumors from the oil country that a compromise has been worked out by state and federal officials. The Senate Interior Committee, headed by Sen. Joseph C. O'Mahoney of Wyoming, is not expected to do anything about tidelands legislation until the Supreme Court hands down its opinions in the Government's cases involving Texas and Louisiana, on which it is scheduled to hear argument March 13.

The bill approved by the subcommittee drops all pretense of offering any compromise by which the federal Government could at least "save face," such as was discussed last year, but holds definitely that the coastal states own the submerged lands out to the 3-mile limit with the exception of Texas, which is given 10½ miles. Within those limits, the federal Government would have only the powers over navigation, etc., which it has exercised in the past and would get none of the revenue from oil or other operations.

The area to be under federal control would lie between the limits of state ownership and the outer edge of the Continental Shelf, but the bill lays down restrictions on federal management in the way of royalty and acreage limitations.

Strong opposition.—The bill definitely is not to the liking of administration leaders, who say privately that it hasn't a chance of enactment. It will be subject to a fight in the judiciary committee itself, from which it may never emerge, and if it does get the approval of that committee it faces vigorous opposition all along the line.

So far as was evident this week there has been no change in the respective strengths of the administra-

tion and state-ownership groups. The former is seen as not quite strong enough to force through a bill for federal management of all lands from low-water mark out; the latter is strong enough to put over a state-ownership bill if it can be gotten to the floor but not to pass it over the certain veto of the President.

This situation is so generally recognized that there has been no suggestion of renewal of the abortive negotiations which House Speaker Sam Rayburn sponsored last year.

The new bill is written along the lines advocated by the National Association of Attorneys General, which has been leading the fight against federal ownership, and in general is much the same as the measure passed by the Seventy-ninth Congress and vetoed by the President on the ground it was premature and should not have been considered until the Supreme Court had passed on the issue.

Terms of bill.—Under its terms, the federal Government would have first call on the oil from the submerged areas, including those of the states, in time of war.

The police power of the coastal states "may" extend to the outer limits of the Continental Shelf and are defined as including, but not limited to, the powers of "taxation, conservation and control of the manner of conducting geophysical explorations."

State ownership and control of land beneath inland navigable waters would be confirmed.

The federal Government would be required to lease the lands in the Continental Shelf under competitive sealed bids, the leases to be for 5 years with a royalty of 12½ per cent and a lease rental of $1 per acre. Leasing units would be not less than 640 nor more than 2,560 acres in proven territory and 2,560 to 7,680 acres in unproven areas.

Existing state leases granted prior to January 1, 1949, would be exchangeable for federal leases, but lessees would not have to account to the United States for exploration and development prior to the effective date of the act.

Mississippi Attacks Imports

JACKSON. — Imports cut oil tax revenue in the state of Mississippi last year by $1,000,000, state lawmakers stated in passing a resolution requesting Congress to curb imports.

Rep. Icey Day, who introduced the resolution, said: "Oil firms can't find markets for our Mississippi oil. Our fields, in many cases, are producing less than one-third of the state oil allowables."

The house resolution said oil conservation is being threatened with demoralization by the loss of markets for oil produced under efficient methods. Immediate congressional action was urged.

INDUSTRY AFFAIRS

Industry Problems

A.I.M.E. members hear 290 technical papers, talks on demand-forecasting, proration, British-ban problems

Dahl M. Duff

NEW YORK. — The weather, Britain's dollar shortage, and market-demand proration mixed with 290 technical papers as topics discussed at the annual meeting of the American Institute of Mining and Metallurgical Engineers here this week.

The weather was discussed by Jerry A. Cogan, economist of Standard Oil Co. (N. J.), in telling the petroleum branch of problems in forecasting oil demand.

Weather has become such an important factor in petroleum supply and demand that studies have been made within the oil industry of the possibility of long-term weather trends or cycles.

The results of these studies have been largely negative to date, and a number of apparent relations have not held up well when subjected to examination by advanced statistical techniques. Considerable work has been done "both by the Weather Bureau and others, including some of my associates," he added.

Cogan gave no demand forecasts but discussed four "troublesome variables"—Weather, general pattern of business, developments in the fields of competitive energy sources, and human vagaries or "psychological factors." Unexpected variations in these, he said, are responsible for most of the supply headaches of the industry.

Gas competition.—Cogan touched on natural gas in discussing the variable of competitive energy sources. The Jersey company's recent study, he said, showed additional gas scheduled in the next 3 years in the East and Midwest equals about 480,000 bbl. daily of fuel oil.

"However, the fuel that keeps both the public and the oil industry guessing on a short-term basis is coal," he said. "To me, at least, John L. Lewis defies prediction. The petroleum fuel-oil business, particularly in the East, has received an unexpectedly strong assist in recent months from this direction. It is fortunate for the consumer that oil has been able to provide the necessary flexibility and step into the gap."

As one of the "psychological factors," Cogan said there is real danger that the last two warm winters which have prevailed in the principal heating-oil areas will unduly influence the thinking and planning for next winter's season.

He pointed out that present information possessed by the industry on secondary stocks in smaller terminals, bulk plants, and consumer tanks is very scanty. Studies by his company, he said, indicated that, for the area

NEXT WEEK

Offshore drilling symposium.—Special 16-page section by seven authors with intimate knowledge of the problems involved in the search for oil under the Gulf of Mexico. Featured are the damages by last October's hurricane on two drilling platforms lying off the Texas coast. This hurricane gave an actual test to current designs of offshore drilling structures. The companies involved and the experts who studied comprehensively this "test run" make the information obtained available to all operators and engineers with interests in offshore operations.

Chlorination of petroleum hydrocarbons.—G. W. Hearne, Shell Development Co., Emeryville, Calif., discusses this subject. The organic chlorides find numerous applications in industry, chiefly as chemical intermediates.

Bothered with slime in cooling water?—Aglae, bacteria growth, and fungi are the troublesome factors. An interpretation of the microbiological analyses needed to determine "what's what" is complicated. But Author R. S. Wise gives a down-to-earth discussion in his paper, "A Practical Approach to Cooling Water Slime," telling what to do.

Lead sulfide treating.—Sinclair Refining Co. has found Bender process, in kerosine sweetening, particularly efficient over a 10-year manufacturing period; production rate 6,000 to 10,000 bbl. per day. Paper by Ira T. Fritz, engineer at Marcus Hook, Pa., refinery.

Planning modern gas compressor stations.—Second of five articles by Tyler G. Hicks, consulting mechanical engineer.

east of the Rockies in the case of kerosine and distillate, fluctuations up and down in these stocks and other unexplained seasonal variations amount to at least 25,000,000 bbl. over a season.

Sterling oil.—The world dollar shortage and its effect on foreign oil development was discussed by Walter Levy, former head of the petroleum section of the Economics Cooperation Administration.

Wrongly conceived interference by the British Government with the complex commercial and economic arrangements of the international oil trade might lead to chaotic conditions costly both to the companies and to the British economy, he warned.

Levy reviewed current conditions in the international oil trade in which American companies are at a disadvantage since they are not permitted to deal in sterling as are their British competitors. Levy told the group that Great Britain must certainly take any reasonable and effective measures which will result in the saving of dollars.

"However, in taking this particular step (replacement of dollar-oil imports with sterling production) the British Government may have overlooked the fact that the world-oil industry is not a British industry whose production, distribution, and prices are subject to Britain's effective control," Levy said. "Any undue governmental interference in one segment of the world oil economy might therefore easily have unpredictable consequence in another.

"If, as a result of unilateral actions of the British Government, American companies should be faced with a prolonged and severe loss of production or with unmanageable surpluses, they might have to reduce their prices in order to maintain a high level of sales."

The British would be likely to follow such a price drop since a dual price system would imply further devaluation of sterling and secondly, consuming countries might prefer cheaper dollar oil to more expensive sterling oil. If this occurred, Levy said "what started as a measure to save dollars might cause a most painful loss of income to the British and the British oil industry."

"Moreover," Levy continued, "if the British Government is to be guided by narrow short-term currency considerations in formulating its oil policy, it might have difficulty in justifying many international oil arrangements of British oil companies which up to now have resulted in the efficient and profitable operation of the world oil economy." Such a policy gives rise to many questions, such as whether the British Government should continue to approve long-term arrangements under which British companies obtain Western Hemisphere or Middle East crude from some American companies, and at the same time exclude from sterling markets crude oil from other American companies with the same or perhaps even a lower dollar-cost component, Levy concluded.

Thompson on proration.—Proration of crude production to market demand, as practiced in Texas, has built up a healthy and expanding oil industry, provided a reserve producing capacity, and given each well a fair share of the market every day, the A.I.M.E. was told by Lieut. Gen. Ernest O. Thompson, member of the Texas Railroad Commission.

Were it not for this, he said, selective buying would give all the market to desirable crudes close to refineries and leave no market at all for other fields, and this would not be fair. But the proration system has worked so well, he said, that there is not a well in Texas without a market today although wells in the state are shut down for nearly half the time due to lack of market demand.

Explaining how market demand is estimated, Thompson denied that the states follow Bureau of Mines forecasts, saying that there is no specific formula and many factors are considered including over-all stocks of crude and products, stocks of Texas crude, the weather, and supplies of competitive fuels.

Thompson on oil economy.—In addition to his formal address, Thompson issued a statement saying that with Britain trying to freeze American oil out of the sterling market and our Treasury Department recommending a cut in the depletion allowance, "the oil man is really catching it at home and abroad."

"We live today in an oil economy," he said. "Our expanding economy depends upon the continued discovery in this country of new oil deposits. If Congress reduces the depletion allowance, oil exploration would be proportionally cut down by the operators. I feel it would almost stop discoveries.

"Drilling finds the oil but it takes a lot of money when 81 wells out of every 100 exploratory wells turn out dry. This is the true record. Many dry holes, too, cost as much as a half million dollars each. This is because we now have to drill 10,000 to 12,000 ft. in the search for new reserves.

"The independent is the fellow who finds most of the oil. The larger companies buy acreage around almost every wildcat so that if it hits, they are in on the show. Without depletion allowance there would be no incentive for these independents and others to hunt for the new fields. The Government tried to find oil in the extreme Northwest during World War II. It was called the Canol project. This futile wartime effort cost more than 100 million dollars. It is a pretty sound idea to leave alone a plan that is getting the job done so well."

Technical papers.—Among the technical papers on the program of the petroleum group was a review of shale-oil development by J. B. Mull, chemical engineer, Bureau of Mines, Rifle, Colo. He gave a progress report on operations at Rifle, avoiding the controversial economic aspects of shale oil. He said that although large-scale refining operations have scarcely started at Rifle, it has been shown that commercial motor fuels, diesel fuels, and light and heavy burner oils can be produced from a raw material that is in effect a low-grade crude oil. Laboratory and pilot-plant investigations indicate a promising possibility of production of still higher-quality fuels than is possible with plant-scale equipment now available.

Well logging.—A new logging method, trademarked Microlog, was described by H. G. Doll, Schlumberger Well Surveying Corp. Very small electrode systems supported on the face of a flexible insulator pad are maintained in contact with the well so that two different electrode spacings simultaneously record relatively small volumes of material behind the wall, thus furnishing a very detailed record of formations and particularly of permeable beds and pay zones.

The new method, said Doll, is an important addition to the conventional electric log, and should contribute to a better and more accurate determination of permeable beds, particularly in limestone territory. Because of its accuracy in the determination of boundaries, he added, it may also render important service in sand and shale formations where it could appreciably increase accuracy of the sand count.

(A description of this micro method was given in The Oil and Gas Journal, December 29, 1949, page 35. A detailed presentation of the Doll A.I.M.E. paper will appear in an early issue.)

Productivity calculations.—Studies of simulated flow patterns into well bores indicate that mathematically derived equations for relative productivity (ratio of flow into casing perforations to flow into open hole) which have been in use are in error, according to a paper by Robert A. Howard and Marsh S. Watson, Jr. Experiments with an electrolyte model were said to show that these calculations are roughly one-third too high.

Dinners.—The main part of the petroleum branch program came to a close Tuesday evening with a dinner at which petroleum branch officers for 1950 were installed. New officers among the group were: John E. Sherborne, assistant to the vice president in charge of research, Union Oil Co. of California, branch chairman; Paul Andrews, chief production engineer,

Signal Oil Co., and R. W. French, vice president in charge of production, Sohio Oil Co., vice chairmen; R. C. Earlougher, Earlougher Engineering, Tulsa, and John McMillan, vice president, Fullerton Oil Co., executive committeemen; and Joe B. Alford, formerly assistant executive secretary who succeeded William H. Strang as executive secretary.

Sunray Buying Control

Directors approve purchase of 800,000 shares of Barnsdall stock at $56 a share; eventual merger considered probable

CONTROLLING interest in Barnsdall Oil Co. will be acquired next week by Sunray Oil Corp., and all indications point to an eventual merger of the two Tulsa companies.

Sunray directors have approved a deal, negotiated by President Clarence H. Wright, to purchase approximately 800,000 shares of Barnsdall common stock for $56 per share. This is the entire holdings of Floyd B. Odlum and the investment companies he controls, Atlas Corp. and Ogden Corp.

The payment of $44,000,000 will be made in cash between February 16 and 25. The money will be obtained partly from company funds and partly from short-term commercial bank loans from Eastman, Dillon & Co., Sunray's bankers, and Guaranty Trust Co. of New York.

Effective control.—This block of stock will give Sunray slightly more than 40 per cent of Barnsdall stock outstanding, which is considered to be effective control of the company.

It is believed that in the near future Sunray will offer to purchase the rest of Barnsdall stock and then will merge the two companies under the Sunray name. This is the pattern followed in 1943 and 1944 when Sunray absorbed Superior Oil Co. of Oklahoma and Darby Oil Co.

No exchange of Sunray stock was involved, but as part of the consideration Odlum was given an option, good until December 1, 1950, to purchase up to 750,000 shares of Sunray common stock at $12 per share.

Barnsdall directors will meet in Los Angeles this week at which time it is probable that directors representing Atlas interests will resign and be replaced by directors representing Sunray's holdings. A statement explaining Barnsdall's position in the transaction is expected to be issued following this meeting.

Odlum optimistic. — Sunray officials made no comment other than to confirm the deal, but in New York Odlum issued a statement saying that the purchase puts Sunray in a position to add substantially to its proven and indicated reserves of oil and gas at a cost far less than through the process of leasing, drilling, discovery, and development.

Sale of the Barnsdall stock, he said, is in harmony with the long-standing policy of Atlas with respect to "special situations" and is not evidence of any loss of confidence on the part of Atlas in the future of the oil industry. He expressed confidence that over a long period the price of crude oil will remain high unless the country's reserves are going to be depleted, adding that the cost of developing new reserves is constantly increasing.

Sunray's net income during 1949, it was announced at the directors' meeting February 11, was $10,200,000, or $1.64 per share of common stock, compared with $15,600,000 in 1948. Its gross operating income last year was approximately $58,000,000.

Phillips Hearing

FPC to determine if firm is subject to Gas Act

WASHINGTON. — Federal Power Commission announced this week that hearings will open March 20 in Bartlesville, Okla., to enable the commission to decide whether Phillips Petroleum Co. is a natural-gas company within the meaning of the Natural Gas Act.

The proceedings may determine whether FPC will extend its authority over natural gas to oil companies selling gas to pipe lines.

A commission announcement said that the hearings will determine the "relevant facts and circumstances" surrounding the company's natural-gas operations. The proceedings involve the rate Phillips charges for gas furnished Michigan - Wisconsin Pipe Line Co.

The investigation is based on complaints from the Wisconsin Public Service Commission and the Detroit Corporation Counsel against "frequent and large increases" in the price of gas bought by Michigan-Wisconsin, for which Phillips is the sole supplier, before substantial deliveries of gas even commenced. No satisfactory basis has been established for these increases, it was charged, and a restoration of the initial contract price would permit a reduction of 5 to 7 cents per M.c.f. in the resale rate.

FPC staff estimates indicate that the annual cost to the pipe-line company under new and amended contracts will be approximately $5,000,000 a year over the cost originally set by the 1945 contract. It was noted that Phillips is selling large volumes of gas to other companies at prices substantially lower than the base prices specified in its contracts with Michigan-Wisconsin.

Aminco Stock Deal

SAN FRANCISCO.—Deep Rock Oil Corp., Tulsa, has sold one-half of its stock in American Independent Oil Co. to four other Aminco partners.

Purchasers were Phillips Petroleum Co., Bartlesville; Sunray Oil Corp., Tulsa; Signal Oil & Gas Co., Los Angeles; and Hancock Oil Co., Long Beach. The deal was completed at the meeting of directors of Aminco here February 9. Company bylaws give partners the option to purchase any stock offered for sale by any participant.

Deep Rock previously had announced its intention to sell to unnamed purchasers. It was one of the original participants in the formation of American Independent, and owned approximately 6.35 per cent of the stock for which it paid about $1,000,000. Deep Rock received $1,100,000 cash for the half of its stock sold to the four other participants.

ASSOCIATIONS

A.P.I. District Meeting

OKLAHOMA CITY.—Subjects pertinent to every phase of the producing industry will be covered at the spring meeting of the American Petroleum Institute's Mid - Continent District, Division of Production, the Skirvin Hotel here March 29-31.

Included will be topics on drilling muds, diamond coring, drilling, secondary - recovery methods, and unit operation.

A general session will be held March 30, and technical sessions will be held both in the morning and afternoon of March 31.

Among topics to be presented are: "Drilling by the Turbine Method," "Oil Emulsion Muds," "Relative Economics of Diamond Coring and Conventional Drilling," and "A Study of the Buckling of Rotary Drilling Strings."

During the March 31 morning session, topics will include: "A Preliminary Report on Oil Recovery by High Pressure Gas Injection," "Review of Gun-Perforating Methods," and "Use of Plastic Pipe in Salt Water Disposal Operations."

Also included during the meeting will be a discussion of the unit operation of the Shuler field, and vocational training in oil-well drilling and production operations.

Pilot-Plant Studies

Atlantic's new pilot-plant building soon to house pilot unit for study of catalytic process for improving octane rating

George Weber

PHILADELPHIA.—A new catalytic process for improving the octane number of gasoline is now being tested by the research department of Atlantic Refining Co. here.

No details are being revealed at present, but the company says the new process has undergone thorough investigation in the laboratory and is now ready for testing in a pilot plant.

Design of the pilot plant is now on the drawing boards, and the unit will soon be constructed in the new pilot-plant building, recently completed adjacent to Atlantic's main research laboratory.

Pilot-plant plant.—This new building is specially designed to make all sorts of tests on a pilot-plant scale, both for developing new methods and for checking the operations of Atlantic's present refineries.

It already houses a number of pilot plants employed for the analysis of new crudes and the testing of catalysts and chemicals. Experimental studies of full-scale plant operations at the Atlantic refineries at nearby Point Breeze and at Atreco, Tex., are evaluated in these pilot studies.

The building incorporates the most modern facilities for pilot-plant installations. It provides 50 ft. of headroom in the center section extending the length of the building. Four operating levels are incorporated in the building's interior, and steam, water, air, refrigeration, and electricity are made readily available at all levels.

The principal unit installed in the building to date is a new catalytic cracking unit with a charge capacity of 6 bbl. per day.

Another refinement in isolating the effects of various charge stocks on catalyst activity is a water-purification unit which employs the mixed-bed ion-exchange process for removal of inorganic salts. Water from this unit, with a purity equivalent to that of triple-distilled water, is used for temperature control in the regenerator. Feed stocks and withdrawn products are maintained at constant temperature to facilitate direct comparison of volume measurement without resorting to temperature corrections.

The catalytic pilot plant is employed mainly to evaluate various operating conditions and correlate them to commercial scale. New equipment for possible adaptation to refinery units is also studied in pilot-plant runs, and some catalyst evaluation work is conducted.

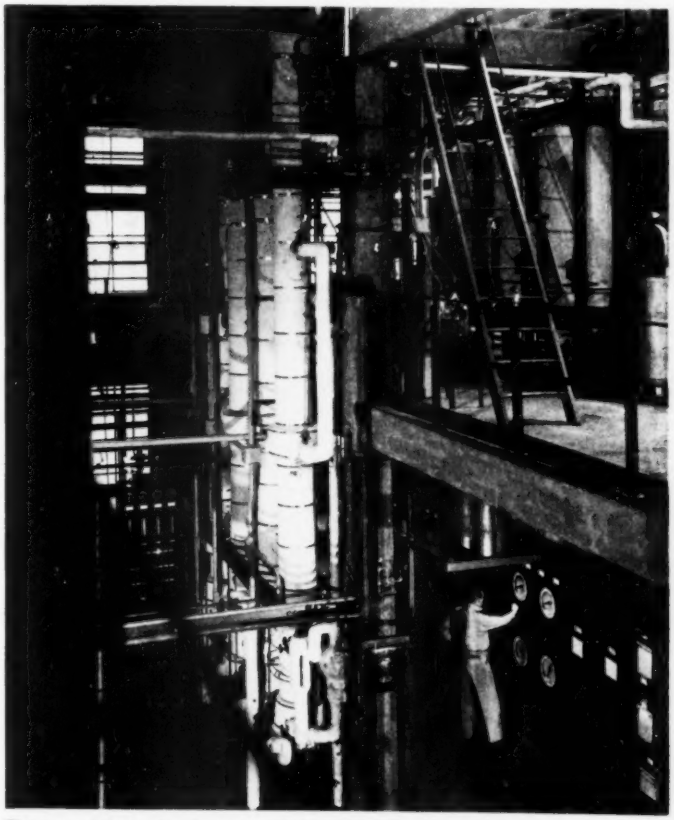
Radioisotopes employed. — Atlantic has joined the growing ranks of petroleum-research groups which are taking advantage of the phenomenal new analytical tool — radioisotopes.

Two important applications of this technique are under way and planned by Atlantic. Now under investigation is a fundamental study of catalysis, concerning the mechanics of methyl radical formation, employing isotope-labeled deuterium compounds. Planned is a wear-measurement study on internal-combustion engines, using irradiated piston rings.

Lubes from sand. — Typical of the "long-shot" projects which progressive research laboratories conduct is the development of an extremely high-melting-point grease-like lubricant. This lubricant comprises a mixture of oil and "sand"—but a sand entirely different from the common variety.

Chemically pure silicon dioxide with maximum particle size of 50 millimicrons (1/1,000 the diameter of a human hair) is blended with oil in the ratio of three volumes to one, making one volume of finished lubricant which shows a grease-like consistency. Mixed at room temperature, this grease has a melting point above 600° F.

Successful lubrication of precision ball and roller bearings has been attained with the new laboratory product. But a laboratory product it remains, at least for the present, for present costs of the thickening ingredient are too high for commercial use.



This view of the fractionating and control-panel sections of the fluid catalytic cracking pilot plant shows two of the four levels provided in Atlantic's new pilot-plant building. Space is reserved for the new pilot unit designed to evaluate the company's new catalytic process, now graduating from research-laboratory status.

LATIN AMERICA

Wildcatting Decline

Tax, legal difficulties largely responsible for drop in exploratory work in Colombia; production at all-time high

Dahl M. Duff

ALTHOUGH Colombian crude-oil production was at a record high last year, the number of exploratory wells dropped off by a third.

Colombian Government figures reviewing the year's operations listed 12 wildcats drilled in 1949 compared to 18 the previous year. Of the 12 wildcats, the only one productive was in the Cimitarra concession of Shell and Socony-Vacuum where the heavy oil found has not since been produced. The 18 wildcats in 1948 resulted in one gas producer by Texaco.

The government data did not include the discovery made by Texaco late in the year in its Tetuan well in the Upper Magdalena Valley. The Tetuan well tested initially 800 bbl. daily of 23°-gravity oil, and the company is now preparing location for a second test.

Reason for decline.—The decline in exploratory drilling last year in Colombia reflects a situation which was given wide publicity during the year. Several companies withdrew or suspended operations there, and tax and legal difficulties, along with some discouraging exploratory results in the past, have been blamed. The Colombian Government early this year promulgated a decree law to remove some of the legal obstacles, and it is now reported to be considering amendments to give further incentives to the industry.

Wildcat drilling.—Of the 1949 wildcats, eight were on government land, and four on private property. Operator and concession for the 11 dry wells follow: Government land, Shell and Socony-Vacuum, Cimitarra, 1; Tropical, Papayal, 1, and El Paso, 1; Texas, Sahagun, 1, and Cananguchal, 1; Shell, La Gaviota, 2; private property—Tropical, Tubara, 1; Tripet, San Andres, 1; and Tropical and Richmond, Gualanday, 2.

Field drilling.—In contrast to the trend of exploratory work, field drilling in Colombia last year showed a considerable increase over 1948. A total of 93 wells were completed of which 89 were productive. A total of 62 field wells were drilled in 1948, of which 59 were productive. Last year's development drilling was in Barco 42 wells, 1 dry; Casabe 45 wells, 1 dry; El Dificil 4 wells, 2 dry; Cantagallo 1 well; and Velasquez 1 well.

Production.—The year's production totaled 29,643,819 bbl., averaging about 81,400 bbl. daily. This includes some light fractions mixed in the crude stream but excludes about 2,200 bbl. daily of other condensate produced separately at De Mares. Production by concessions: De Mares 11,856,423; Barco 9,460,866; Yondo 6,226,727; Cantagallo 336,932; Dificil 1,523,519; and Velasquez 239,352.

Of the total production, 8,549,751 bbl. was refined in the country, 8,322,975 at Barranca-Bermeja, and 226,776 at Petrolea. The total refined at the two plants in 1948 was 7,084,708 bbl. Exports from Colombia last year totaled 23,671,545 bbl., with 15,053,793 bbl. from Mamonel, the terminal of the Andean National line from De Mares, and 8,617,752 bbl. from the Covenas terminal of the South American Gulf line from Barco. Throughput of these lines last year was: Andean 16,346,221 bbl., and South American Gulf 9,342,235 bbl.

The total value of the oil exported last year from Colombia was $58,000,400.10 against $47,875,440.33 the previous year. Among the principal developments during the year was the commencement of commercial production by Texaco at Velasquez January 29. Price changes included a reduction of 38 cents by Tropical, and 27 cents by Shell for Yondo crude. At the end of 1949, only one wildcat drilling operation was active. This was that of Texaco at Tetuan near Ortega.

New I.P.C. Subsidiary

A new subsidiary, Esso Colombiana, S.A., has been formed and registered under the laws of Colombia as a subsidiary of International Petroleum Co., Ltd.

While the charter of Esso Colombiana is general and embraces all phases of oil development, refining, transportation, and marketing, it is intended that the company will, initially, be interested principally in transportation, operation of bulk plants and service stations, and marketing operations generally.

Once the company has become operative, it is the intention to offer a substantial share interest to Colombian capital. It is expected to be some time before the new company commences to carry on operations.

International's present Colombian operations are carried on mainly through Tropical Oil Co. which is the leading marketing, as well as producing and refining, company in the country. L. W. Wiedey, Ernest Johnson, Luis Arango Velez, Pablo E. Pareja, and F. J. Espinosa, Tropical officials, are organizers of the new company.

Oil-Meat Letdown

British-Argentine trade is well under expectations

THE volume of trade resulting from the British-Argentine "oil for meat" agreement of last year has fallen considerably short of expectations.

Partly because of British resistance to high Argentine prices, trade thus far has degenerated into a virtual barter of necessary quantities of the two essential commodities. This is in spite of efforts to strike a high-level balancing agreement between the two countries.

Argentina's total liquid fuel imports last year are about 14 per cent under those of 1948. Imports in 1949 totaled 3,929,665 tons. At the time the bilateral agreement was signed last spring, it was said that Britain would supply Argentina with some 5,700,000 tons annually of crude and products, principally fuel oil.

The agreement was denounced at the time by American oil officials as excluding them from a major Latin American market. Since then, it is reported that the British have been buying American produced oil in Venezuela to meet some requirements under the agreement.

Argentina's liquid-fuel imports are summarized in the accompanying table.

(Figures in metric tons)

	1949	1948
Fuel oil	2,158,256	2,648,308
Crude	1,479,267	1,623,168
Aviation gasoline	28,214	
Diesel oil	59,001	84,964
Gas oil	12,638	
Kerosine	42,874	40,996
Naphtha	149,415	193,612
Total	3,929,665	4,591,048

Consultations between British and Argentine officials are scheduled in Buenos Aires Feburary 28 in accordance with terms of the trade agreement. Among other matters, the conference will take up the subject of Argentina's meat prices which Argentine authorities are eager to increase as a result of sterling devaluation.

Another development in the relation of the dollar shortage to the

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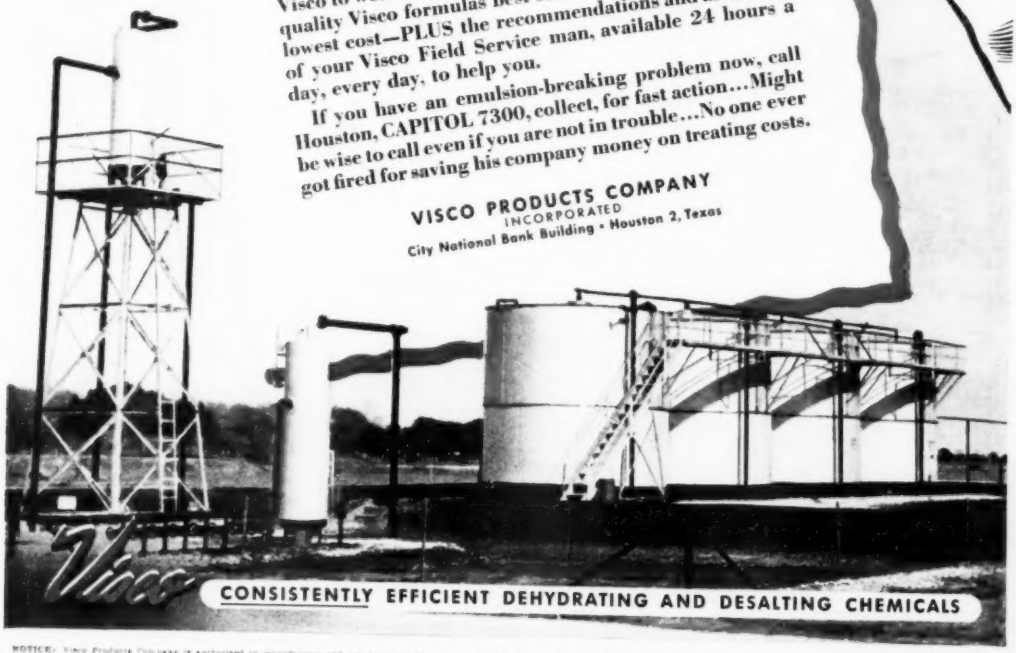

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Neutral Zone Test Is Dry

THE first well drilled in the Kuwait-Saudi Arabia Neutral Zone was dry and abandoned at 5,020 ft. The rig has been moved to a new location and a second well is being drilled.

The well was drilled jointly by American Independent Oil Co. and Pacific Western Oil Corp., each of which has exploration rights in an undivided half interest in the zone. Joint drilling contractors for the combined enterprise are Kerr-McGee Oil Industries, Inc., and Brown Drilling Co. This picture shows the drilling rig on location in the neutral zone, and James McPherson, Aminco's vice president and general manager (in business suit), with the drilling crew.

The large portable rig and other equipment was transported to the zone on the Aminoil, a converted LST, especially equipped to serve as a floating camp and supply base, which sailed from Orange, Tex., September 30. The first well was located about 16 miles south of the Kuwait border and 20 or 25 miles south of the large Burghan field in Kuwait proper.

The announcement that the well had been abandoned, made by Aminco headquarters in San Francisco, referred to it as a structural test well and said that it was carried deep enough to obtain electric-log correlations with Burghan wells. These indicated that the test was probably located on the east flank of a structure running north and south. It is understood that the company believes there is a fault through the structure to the west of its first test. The announcement stated that a second location farther west will be drilled to obtain additional geological information and further to distinguish the structural features of the region, and also that geophysical work will be continued in the area.

Latin American petroleum trade came last week from Chile. Reports from Santiago said foreign oil companies there had been asked not to insist on dollar payment for oil products supplied to the country.

Mexican Conference

A 2-week conference dealing with all phases of the activities of Petroleos Mexicanos, Mexican Government oil organization, will open February 20 in Mexico City.

Other countries in the Western Hemisphere have been invited to send representatives to this first technical convention of Pemex. While Pemex officials and technicians will give all the discussions scheduled on the program, several talks by other representatives are expected.

Antonio J. Bermudez, director general of Pemex, is chairman of the conference organizing committee, and M. Rodriguez Aguilar, Pemex exploration manager, is vice chairman. Honorary chairman is Miguel Aleman, president of the Republic of Mexico, who is scheduled to appear at the opening session February 20 and at the closing session March 4.

A total of 66 papers are listed on the program. They deal with a wide range of subjects in the fields of geology, exploration techniques, production, refining, marketing, labor and industrial policies, and medical services.

The introduction of the conference program states that its purpose of the meeting is to lay groundwork for close cooperation in petroleum matters among the countries of the Western Hemisphere.

Tortuguero Offset Spudded

Mexican American Independent Oil Co. has spudded its 2 Tortuguero, an offset to its first successful Mexican test, in southern Veracruz on the Gulf of Mexico.

The company's 1 Tortuguero was brought in late in January with a reported potential of 5,000 bbl. daily. This week, however, the well was reported making only 300 bbl. daily.

The first well was drilled from the beach and is bottomed about 2,500 ft. offshore.

Completion of the well was delayed because of the difficulty of correlating electric logs with drill-stem measurements. The well also was reported sanding badly, and it was felt an accurate estimate of the new field's productivity would have to await completion of the second well.

Mexican American's other test under way, its 1 Xicalango, in Campeche State, was reported making little progress. The wildcat encounterd high-pressure gas a little below 4,000 ft. and the problem has not been completely overcome.

AUSTRALIA

Australian Rebellion

Gasoline rationing ended in spite of Britain's wishes to the contrary; imports of products from France expected

ACTING against the openly expressed wish of the British Government, Australia last week ordered an end to gasoline rationing.

Derationing and additional imports of motor fuel were pledged by the antilabor government of Australia during the election campaign last December.

Australia is a part of the sterling currency area, and the British opposition was on the grounds derationing would cause further loss of dollars. To meet the added demand from derationing, Australia is expected to seek supplies from such non-dollar sources as France.

Britain's own labor government is now in an election campaign, and the continued tight rationing of gasoline in the United Kingdom itself is a sore point with many voters.

False economy.—R. G. Menzies, prime minister of Australia, announced in Canberra the plan to halt rationing this month. He said Britain would "have liked us to reach a different conclusion." He also said that "we are clear that in Australia any attempt at dollar saving by gasoline rationing is false economy." Backing up this statement, he cited the growth of population and what he termed a strain on the nation's railroads.

British view.—In London, Prime Minister Attlee said in a written statement that "the danger is that if one member of the sterling area relaxes its efforts (in limiting the amount of dollar expense) others may be tempted to follow suit." His statement said the British Government had been in consultation with Australia about derationing. It added that Britain itself could not deration gasoline "without grave interference with supplies of vital foodstuffs and raw materials."

Background.—Gasoline rationing has been an issue in Australia since it was first instituted prior to the Japanese invasion of the Southwest Pacific. Last summer, courts held invalid the act under which rationing was being continued, and after a lapse, it was reinstituted by state control. Public pressure for ending the restrictions was renewed shortly after the election. A 6-week strike at the Shell company's refinery in New South Wales, causing the loss of about 1,000,000 gal. weekly of domestic refined production, contributed to the delay.

Consumption of gasoline in Australia in the year 1948-49 amounted to 408,439,000 gal. (about 32,000 bbl. daily), and a recent report of the government's Division of Industrial Development of the Department of Postwar Reconstruction estimated current annual demand for gasoline at present prices to be about 500,000,000 gal. annually (about 39,000 bbl. daily). The country has no indigenous crude production, and domestic refining production satisfies only about 16 per cent of over-all petroleum requirements.

Of the petroleum products imported into Australia, 63 per cent comes from the Middle East, 22 per cent from the East Indies, and 14 per cent from the United States. Since 1939, motor-car registrations in the country have increased from 562,271 to 641,073 and commercial vehicles from 258,025 to 442,229.

CANADA

Refinery Contract Awarded

Imperial Oil, Ltd., has awarded contract to Canadian Kellogg, Ltd., for engineering and construction of a complete refinery in Winnipeg, Man. The plant will have a capacity of 12,000 bbl. daily and is scheduled for completion by May 1951.

The refinery will be Winnipeg's first and will more than double the refining capacity of the Province of Manitoba, whose three existing refineries process approximately 5,300 bbl. daily of crude.

Proposed equipment will include an atmospheric and vacuum pipe still, a fluid catalytic cracking unit, treating plant for gasoline and middle distillates, an electric substation, utility plant, and all offsite facilities.

Crude for the new installations will be moved either by rail or branch pipe line from a take-off point of Interprovincial Pipe Line Co.'s new line at Gretna, Man.

***RECOGNITION.** — This new postage stamp will be issued March 1 by the Canadian Post Office Department in recognition of the postwar oil discoveries made in the prairie provinces. The new stamp will replace the current design of the 50-cent denomination. The stamp, to be green in color, recognizes the developments in the oil industry as one of the most significant contributions to Canada's economy since the war.*

EUROPE

German Test Finds Oil

Quakenbrueck 5, German wildcat near Quakenbrueck - Badbergen, has found oil in the Lower Wealden-Serpulite at a depth of about 1,850 ft. The well was drilled by Oldenburgische Erdoel G.m.b.h., a joint-interest company of Deutsche Vacuum Oel. A.G., and Gewerkschaft Brigitta.

The discovery has not been fully evaluated; the well flowed with a high paraffin content. Quakenbrueck is situated east of the Emsland oil area along the Dutch border in an area where no oil has hitherto been found. It constitutes a possible link between the Emsland and the Hanoverian oil districts.

Shell Research Program

A total of 70,000,000 guilders (about $18,500,000) has been allocated by the companies of the Royal Dutch-Shell Group for research work in 1950. The companies' laboratories in Amsterdam and Delft will carry out research into new industrial uses of crude oil and motor fuel and will study the possibilities of setting up new industries based on raw materials from petroleum.

U. K. Ships Servicing Unit

The first high - capacity truck-mounted oil-well servicing unit to be designed and manufactured in the United Kingdom recently was shipped from London to Cabimas, Venezuela, for use by Shell in the Lake Maracaibo region.

The unit was reported in London to be one of 10 ordered by Shell. Three more will go to Venezuela, and the remainder to Indonesia, Trinidad, and Egypt. The 25-ton units were designed and made by Woodfield Hoist Co., Ltd., of Rochester, Kent., and were said to represent a dollar saving of about $250,000.

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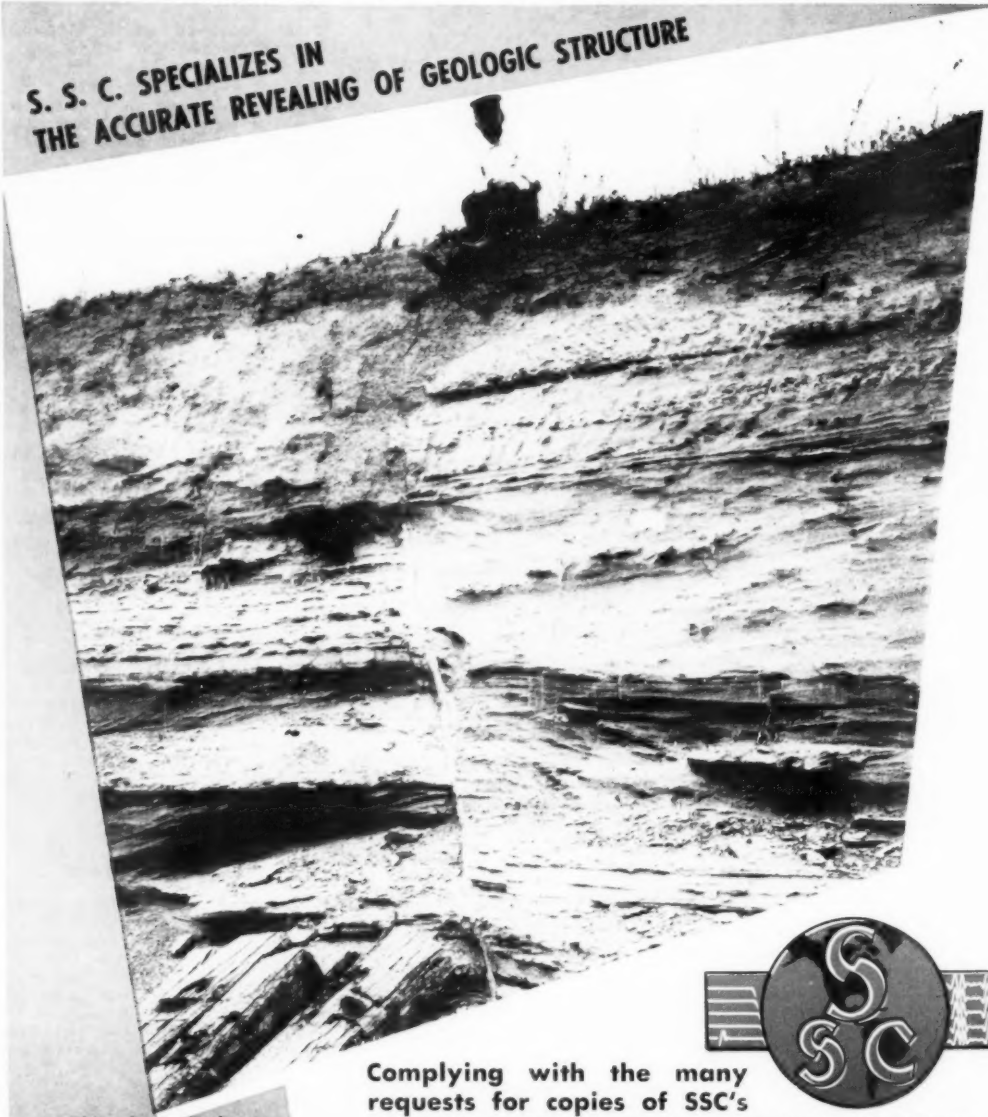

This photo discloses a fault in the Gering Series, south of Crawford, Nebraska.

Complying with the many requests for copies of SSC's advertisements featuring Geologic Structure, the series, of which this is the first, will be repeated.

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PERSONALS

New Duties

Poe general superintendent of Ohio Oil's production

NOW serving in his newly assigned capacity as general superintendent of the production department for Ohio Oil Co. at Findlay, G. Frick Poe, formerly division production superintendent at Houston, is a veteran in the producing division of the industry, having been with the company for more than 25 years.

A native of Van Buren, Ohio, Poe attended college at Wooster, and joined Ohio Oil as a roustabout at Rock River, Wyo., in September 1923. Three years later he was made foreman in the Salt Creek area, and in June 1931 was named foreman at Neiber Dome.

In 1932 Poe moved on to Byron and remained there until October 1939. At that time he became assistant manager of the company's Rocky Mountain division. In March 1942 he became superintendent of production of that division, and in 1945 was named superintendent of production for the Casper, Wyo., division. He held this position until June 1948, when he was named division superintendent at Houston.

In his new position as general superintendent of production, Poe succeeds Fred E. Smith, who was recently named assistant manager of the production department. O. V. Henry, division superintendent at Casper, succeeds Poe in Houston.

J. P. Vezzetti has been named president of Sunset Oil Co., Los Angeles, succeeding **Thomas F. Fournier,** who has been named chairman of the board of directors.

Eric R. Kent, research and development department, Socony-Vacuum Oil Co., Inc.'s, laboratories, Paulsboro, N. J., has been selected to receive the 1950 incentive fellowship award of the company for advanced study for a doctor's degree.

J. R. Underwood, Jr., Shreveport, has joined Sohio Petroleum Co. as engineer, and has been assigned to the Baton Rouge, La., area.

W. F. Ellison, Dallas, has joined the civil-engineering staff of Magnolia Petroleum Co. at Oklahoma City.

P. McDonald Biddison, consulting engineer, Chicago, has moved to Tulsa and has opened offices in the Beacon Building.

E. F. Johnson, Standard Oil Co. (N. J.), and **Albert E. Thayer,** California-Texas Oil Co., Ltd., are among the 37 new directors elected recently by the National Foreign Trade Council.

Olin Culberson, Texas Railroad Commissioner, has been appointed to the Interstate Oil Compact Commission's regulatory practices committee by **Gov. Roy J. Turner,** of Oklahoma, commission chairman.

C. B. Schwartz, vice president and chief geologist of Cook Drilling Co., Fort Worth, has resigned to open a consulting office in the Sinclair Building, Fort Worth. Prior to joining the drilling company, he was geologist for Carter Oil Co. for 10 years.

Elster A. Smith, Lone Star Gas Co., Dallas, has been named engineer in the company's exploration and gas supply department.

R. M. Chan, vice president, Magnolia Petroleum Co., Dallas, has been named president of the Dallas Petroleum Club. Other officers elected were: **F. J. Kopp,** vice president; **J. W. Timmins,** secretary; and **D. H. Voss,** treasurer. Earlier the membership had named **E. Dale Mount, Morris G. Spencer, E. W. Wilson,** and Timmins to 3-year terms as directors.

A. Leon Derby, Jr., has been re-elected president of the Kansas Independent Oil and Gas Association. Other officers include: **Pierce Musgrove** and **Richard Harwood,** vice presidents; **R. B. Parriott,** secretary; and **Jack Heathman,** treasurer. **E. B. Shawver** is a lifetime vice president of the group.

M. W. Curtis, production superintendent for Vierson-Cochran Oil Co., has been elected chairman of the Seminole, Okla., chapter, American Petroleum Institute. Other officers named include: **F. J. Wilbanks,** Bethlehem Supply Co.; **Luther Miller,** National Supply Co.; **Jack Campbell,** Carter Oil Co.; and **A. H. Massad,** Magnolia Petroleum Co., vice chairmen; **Felix Gordon,** Carter Oil Co., secretary-treasurer; and **R. B. Rundle,** retained as chairman of the advisory board.

B. K. Ullmann has taken over the duties formerly in charge of **Andre Dubos,** for S.N.M.A.R.E.P., the purchasing agency for French operating oil companies, New York. Dubos has left the company. **M. R. Thomas** is supervisor of the New York office.

Ward O. Longworthy, former assistant superintendent of Imperial Oil, Ltd.'s Regina refinery, has been appointed superintendent, succeeding **Clifford R. Moore,** who retired recently. Longworthy is succeeded by **William J. Beynon,** until recently assistant to the operations manager of the company's manufacturing department, Toronto.

James E. Allison has been appointed assistant superintendent of pipe lines, Divisions 1 and 2, for Texas Gas Transmission Corp., New York, and will be headquartered in Owensboro, Ky. He joined the firm in 1948 as a construction engineer for the company's 26-in. natural-gas line from Texas to Ohio. Before going with Texas Gas he was pipe-line superintendent for Modern Welding Co.

Ralph A. McGoey has resigned from Union Oil Co. of California, after 20 years of service, and has entered the consulting business as petroleum engineer and geologist, with headquarters in Bakersfield, Calif. A graduate of University of California, McGoey at the time of his resignation from Union Oil was serving as division superintendent in the San Joaquin Valley.

A. W. Butler has been appointed assistant district superintendent of Magnolia Pipe Line Co.'s North Basin district, with headquarters at Brownfield. He was formerly chief gager of the western pipe-line division. Other changes include: **B. B. Balke,** transferred to Midland as chief gager succeeding Butler, from the southern division at Alice; **Homer Cranfill,** advanced to chief gager of the southern division; **M. E. Bay,** assistant district superintendent of Magnolia's North

PERSONALS

Basin at Brownfield, transferred to Wichita Falls in the same capacity; and **J. S. Black,** named district foreman of the West Texas district, with headquarters at Snyder. In Magnolia's producing department, **Gerald L. Smith** has been transferred from the Falfurrias district to the Dallas offices as petroleum engineer.

Manuel Rodriguez Aguilar, head of the exploration department of Petroleos Mexicanos, has been named president of the newly organized Mexican Association of Petroleum Geologists. Other officers include: **Alfonso Barnetche,** head of the production department, as vice president; and **Guillermo P. Salas,** as secretary-treasurer. Charter members include some officials of DeGolyer & MacNaughton, Cities Service Oil Co., and Mexican-American Independent Oil Co. The association has issued the first copy of its monthly bulletin. Editor is **Manuel Alvarez, Jr.**

H. W. Rigterink has been appointed general manager of the liquefied petroleum gas department of Sun Oil Co., Philadelphia, succeeding **William H. Bateman,** who resigned recently. **Joseph C. Fletcher,** formerly chief engineer of the department, has been named sales manager.

Jack Allen Morgan, petroleum engineer at Kilgore, Tex., for Sun Oil Co., has been transferred to Brookhaven, Miss., in the same capacity.

Cruce N. Dunnam, tool pusher at Hugoton, Kans., for Midwestern Drillers, is now at Hooker, Okla., running rigs for Plains Natural Gas Co.

Stuart Mossom has been appointed coordinator of Magnolia Petroleum Co.'s offshore operations in the Gulf of Mexico. Mossom's functions will be those of a staff capacity, representing Magnolia in its relationship with Continental Oil Co. and Newmont Oil Co., coowners of some of the company's properties off the coast of Louisiana and Texas.

Joseph R. Ault, Carter Oil Co. engineer at Tallulah, La., has been moved to the Canton, Miss., area in a similar capacity.

Charles B. Paine, formerly waterflood operator at Nowata, Okla., for Pure Oil Co., has been transferred to the Cumberland field, Madill, Okla., as petroleum engineer.

Jesse L. George, Jr., geologist at Abilene, Tex., for Sohio Petroleum Co., is now serving as district geologist in the company's Houston district.

David B. Meisenheimer, formerly field engineer at Odessa, Tex., for The Texas Co., has been transferred to Fort Worth as reservoir engineer.

Harold C. Price, president of H. C. Price Co., pipe-line construction firm, Bartlesville, Okla., is en route to Europe where he will conduct an extensive business trip. He will visit England, France, and Italy during his 2-month tour.

Jack A. Nelson, Chicago, diesel engineer with Standard Oil Co. (Ind.), has been appointed general chairman of the national diesel-engine meeting of the Society of Automotive Engineers, Inc., which will be held in Chicago November 2-3.

Lester B. Johnson has been appointed foreign-exchange manager of Standard Oil Co. (N. J.). His former position as senior foreign-exchange manager for the European and North African areas has been taken by **Allan W. Hamilton,** previously a junior analyst. Johnson, a native of Bronxville, N. Y., was graduated in economics from Wesleyan University and joined the Jersey company in 1939.

William R. Boyd, Jr., formerly president of American Petroleum Institute, New York, and formerly chairman of Petroleum Industry War Council, Washington, D. C., has opened law offices in Teague, Tex., for consulting practice. He will specialize as a consultant-adviser to oil and gas-company directorates, management, and legal departments on public relations, inter-industry relationship, and legislation. In addition, he will negotiate for sale or purchase of producing properties, merger of companies, and other transactions.

R. J. Andress, director in charge of traffic for Stanolind Pipe Line Co., has been reelected chairman of the Shippers Oil Field Traffic Association.

Robert Breed, geological scout for Sohio Petroleum Co., has been elected president of the Michigan Oil Scouts Association. Other officers include: **Earl Hess, Jr.,** Superior Oil Co., vice president; **Dale Anderson,** Carter Oil Co., secretary; and **Ray Harrison,** Smith Petroleum Co., treasurer.

L. C. Monroe, formerly manager of distribution for Union Oil Co. of California, has been appointed manager of distribution and traffic, succeeding **J. D. Rearden,** traffic manager, who retired recently.

Walter M. Cheney, drilling foreman in the Rocky Mountain division, Casper, Wyo., for Shell Oil Co., has been transferred to Ventura in the same capacity. He was located at Ventura before being transferred to Casper last July. **Edward P. Mooney,** driller, has also been transferred from Casper to Ventura, and **Robert J. Woodward, Jr.,** Ventura exploitation engineer, has been transferred to the Los Angeles office as administrative assistant.

HOUSTON A.P.I. OFFICERS.—New officers of the Houston Chapter, American Petroleum Institute. Seated, left to right: S. C. Oliphant, Stanolind Oil & Gas Co., vice chairman; Melvin L. Dick, Parkersburg Rig & Reel Co., secretary-treasurer; W. B. Duncan, Houston Oil Co. of Texas, chairman; and Byron Meredith, Meredith, Clegg & Hunt, vice chairman. Standing, left to right, are members of the advisory board: W. S. Crake, Shell Oil Co.; W. O. Bartle, Brewster-Bartle Drilling Co.; Charles C. Brown, Pure Oil Co.; Charles Alcorn, Falcon-Seaboard Drilling Co.; and T. J. Fuson, Humble Oil & Refining Co. Members of the board not in the picture include: John Domercq, Jr., Standard Oil Co. of Texas; H. F. Hopkins, Halliburton Oil Well Cementing Co.; Dudley Tower, Union Oil Co. of California; and W. C. Kneale, The Texas Co.

Frank Goss has been transferred from Ingleside, Tex., to Baytown and promoted to operating superintendent of the process and oil movements division of Humble Oil & Refining Co.'s plant. Goss was for many years superintendent of the Humble Ingleside refinery, which closed soon after World War II.

E. E. Tucker, formerly of Conroe, Tex., has been transferred to Snyder, Tex., and named foreman of the newly created district of Tide Water Associated Oil Co.

William B. Harper, petroleum economist, has joined the New York staff of American Petroleum Institute as director of research.

R. H. Rantala, formerly division reservoir engineer for Pure Oil Co. at Fort Worth, has been made magnetic and gravity interpreter. Other changes in the Texas producing division include: **A. J. Betts,** named division reservoir engineer of the development section; **H. L. Keener,** transferred from Pure's Dollarhide field to the Fort Worth general offices in the capacity of geologist; **S. G. Johnston** moved from Fort Worth to succeed Keener as district geologist at Dollarhide. **Carol W. Payne,** district geologist at Midland, named division seismologist; **Gene C. O'Connor,** landman at Shreveport, moved into the Fort Worth offices; **S. L. Tabor,** formerly chief material man at Newark, Ohio, transferred in that position to Fort Worth; and **James W. Collier,** formerly engineer in the production engineering department, made engineer in the division's newly formed gas department at Fort Worth.

MIDLAND GEOPHYSICAL SOCIETY OFFICERS.—Newly elected officers of the Midland, Tex., Geophysical Society are, left to right: C. Win Payne, division geophysicist, Pure Oil Co., first vice president; W. L. Homan, supervisor, Republic Exploration Co., secretary; E. L. Mount, geophysical supervisor, Continental Oil Co., treasurer; Lorenz Shock, supervisor, National Geophysical Co., Inc., president; and J. B. Worley, Strawn Merchandise Co., second vice president.

T. R. Knapp has resigned as geologist for Sohio Petroleum Co. in Michigan, and will enter consulting work. Sohio's land and geological district offices in that state will close March 1, and **W. R. Swetland,** district landman, will be transferred to Evansville, Ind.

Joe L. Terry has been transferred from Victoria, Tex., to San Antonio as geological scout for Houston Oil Co.

DEATHS

George Nelson Moore, 71, former president of Shaffer Oil & Refining Co., forerunner of Deep Rock Oil Corp., and formerly manager of the refining division of Cosden & Co., Fort Worth, died in Decatur, Ill., February 11. He organized the Moore Refining Co. in Arkansas City, Kans., in 1922, and served as president of Western Petroleum Refiners Association from 1921 to 1924.

Ezequiel Ordonez, 82, dean of Mexican geologists who did pioneer exploration work for Mexican oil, died February 8 in Mexico City. Educated at the National Engineering School in Mexico City, he was geologist to the Mexican Geologic Institute and the Mexican Petroleum Co. of California.

Howard A. McDonald, 52, independent oil producer and formerly with Shell Oil Co. in South America, was killed in an automobile accident near Wasco, Calif., January 28.

Carl H. Alsberg, 65, manager of the Franklin refinery division of L. Sonneborn Sons, Inc., died February 9 in Franklin, Pa. He joined Sonneborn Sons in 1911 and from 1923 to 1925 managed the Daugherty oil refinery at Petrolia, Pa. Since 1925 he had resided in Franklin.

Harry K. Floyd, 55, vice president and general manager of Buckeye Pipe Line Co., died in Lima, Ohio, February 3. He had been in the pipe-line industry since 1913, when he joined the company in Ohio. He was appointed assistant superintendent of the firm in 1937, and became superintendent in 1938. He was named vice president and general manager of the firm and its subsidiaries in 1948.

William Harrod, retired head of Shell Oil Co.'s southern scouting division, died recently in Placerville, Calif.

Carl Gibbons, 83, retired vice president of the Gibbons Drilling Co., Tulsa, died in Claremore, Okla., February 11.

Morley Albert Evoy, 69, who drilled wells for Anglo-Persian Oil Co. in Persia, and later in Venezuela, died in Petrolia, Ont., recently.

Lloyd Noble, 53, Ardmore, Okla., founder of Noble Drilling Co., Inc., died in Houston February 14. He retired from the presidency of that company last April and became chairman of the board of directors. A native of Ardmore, Noble at the time of his death was chairman of the boards of directors and president of Samedan Oil Co., Old Ocean Oil Co., and J. S. Abercrombie Oil Co., Houston.

Edgar Poe Thomason, 82, employe of Gulf Oil Corp.'s refinery at Port Arthur, Tex., for 22 years, died February 3.

William Marion Shaver, 85, retired employe of Mid-Continent Petroleum Corp.'s production department, died in Tulsa February 9.

Paul Coulston, foreman at Esso Standard Oil Co.'s Bayonne, N. J., refinery, and an employe of the company for 35 years, died January 31.

August H. Pederson, foreman at Tide Water Associated Oil Co.'s Bayonne, N. J., refinery, died January 30.

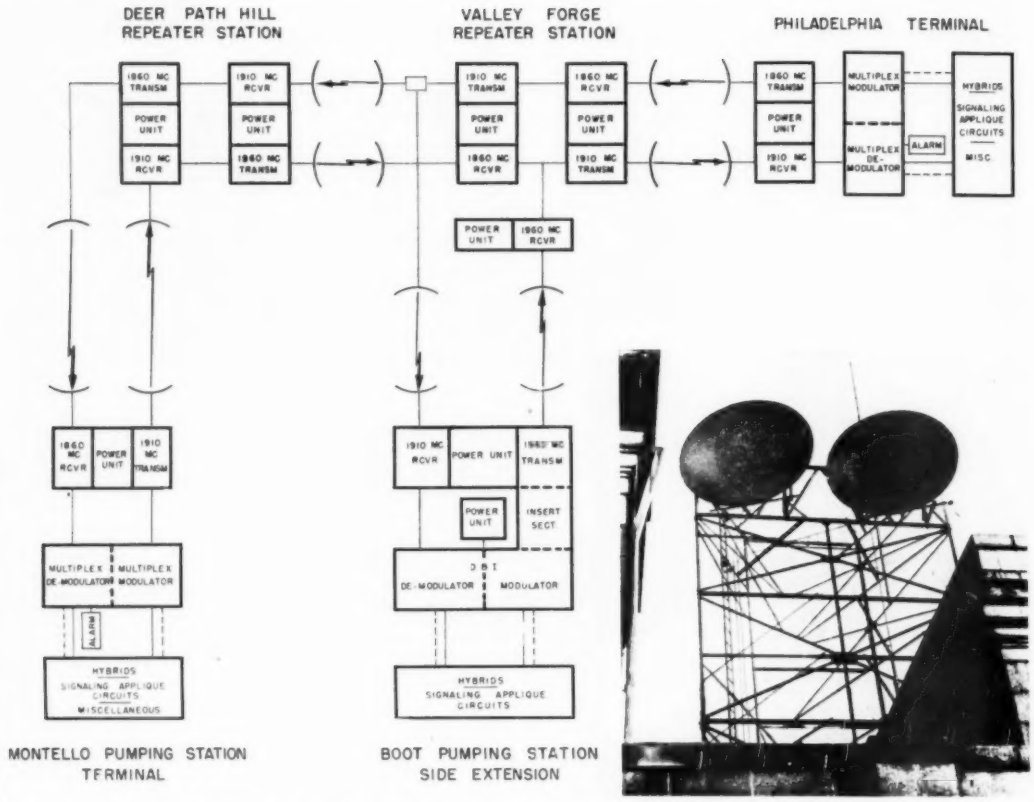


Fig. 1—Simplified block diagram of the microwave radio relay system installed in eastern Pennsylvania for Keystone Pipe Line Co. Fig. 2—(Inset) East terminal antenna installation of the new Keystone system. Shown are 10-ft. parabolic transmitting and receiving antennas mounted atop the Atlantic Refining Co. Building in Philadelphia.

Keystone Pipe Line Co. First to Utilize

Multichannel Microwave Radio Relay . . . for pipe-line

by J. D. Munton*

KEYSTONE PIPE LINE CO., a subsidiary of Atlantic Refining Co., has become the first pipe-line operator to use a microwave radio relay system for communication. A microwave Pulse Time Multiplex radio relay in the range of 1,850-1,950 megacycles, providing facilities for continuous unattended telephone, telegraph, telemetering, and remote-control service on one RF channel, has been installed for Keystone in eastern Pennsylvania by Federal Telephone & Radio Corp., Clifton, N. J., (manufacturing associate of International Telephone & Telegraph Corp.).

This latest installation of the Federal P.T.M. (Pulse Time Multiplex) system features an ultimate capacity of 23 speech channels, each including duplex equivalent d.c. signaling channels for ringing or dialing. Although originally designed for 23-channel operation, this system is also engineered for 8-channel ultimate grouping, or with stackable channels as may be required. At present only five channels are being used in this installation, with the remaining potential reserved for future expansion.

System Requirements

The pipe line served by this radio relay lies between Philadelphia and Montello, a distance of 60 miles. At Montello, the system ties in with existing wire lines extending to both Pittsburgh and Buffalo, the two terminals of the pipe line. The sector between Philadelphia and Montello was previously served by wire-line facilities leased from and serviced by a wire-line company. The high

*Manager of communications, Keystone Pipe Line Co.

Fig. 3—Deer Path Hill repeater station. Parabolas on left face of 100-ft. tower are directed toward Valley Forge repeater station; parabolas on rear face of tower are directed toward Montello Terminal station. Mounting provisions have been made for six additional parabolas for future extension to north, west, and south.

System communication

cost of this service, coupled with the continuing possibility of abandonment of these lines by the operating company, caused Keystone to look for other means of communication.

Utmost reliability is considered a major factor in the selection of a pipe-line communication system because of the nature of this type of operation. Keystone Pipe Line, acting as a common carrier, pumps petroleum products through two lines, one of 8-in. diameter, the other of 12, from a refinery at Point Breeze, Philadelphia, to Pittsburgh on the west line and Buffalo on the north line. These lines, operating at pumping pressures of approximately 1,000 psi., have pumping stations at approximately 30-mile intervals. It is these stations which maintain delivery schedules of products, either to the end of the line or to any designated storage depot along the line.

The line itself between Philadelphia and Pittsburgh holds 2.5 million gallons of liquid product and may contain a variety of products from each of several producers, ranging from fuel oil to high-octane gasoline. Each of the products of any one producer may be scheduled for delivery to any of the storage depots along the line. The efficient operation of such a pipe line requires a maximum degree of coordination between the dispatcher at the sending end and the operating personnel at the pump stations. Such coordination is possible only through the use of a constant, reliable communication system.

Indicative of the need for dependable communication is the practice of having each pump station report to the dispatcher every half hour in a staggered system, 24 hours a day, giving data on volume, pressure, and product passing that point during the past half hour. The dispatcher, in turn, orders the pump-station attendant to change his delivery rate, divert products for storage or delivery at his location, or take his pump off the line. A completely reliable communication system is of importance to provide warning of pressure changes. Beyond providing the required circuit capacity and reliability, the radio relay contributes greatly to operating economies through the elimination of the road crews necessary to maintain long pole lines. With radio, maintenance is concentrated at relatively few terminal and repeater stations.

Installation Sites

Before a microwave relay can be considered as a communication system between two points, the possibility of establishing a reliable line-of-sight path between these points must be investigated. This must be dealt with not only from the viewpoint of the propagation of microwaves, but also from the viewpoint of economy, availability of land, and the availability of power and access roads to the sites.

As projected, the Keystone installation had to provide traffic circuits between the central office of Atlantic Refining Co. at 260 South Broad Street, Philadelphia; the Boot pumping station near Exton, Pa., (a distance of 20 miles); and the Montello pumping station at Sinking Springs, Pa., (approximately 36 miles from Boot).

First consideration was given to the choice of probable repeater sites after a study of topographical maps of the region. Due to the nature of the terrain, the three locations could not be linked directly without the use of prohibitively high towers. The radio path extends approximately east and west. This path is cut by a series of parallel ridges running northeast and southwest, and whose elevations increase progressively in the direction of Montello. Looking

(Continued on page 110)

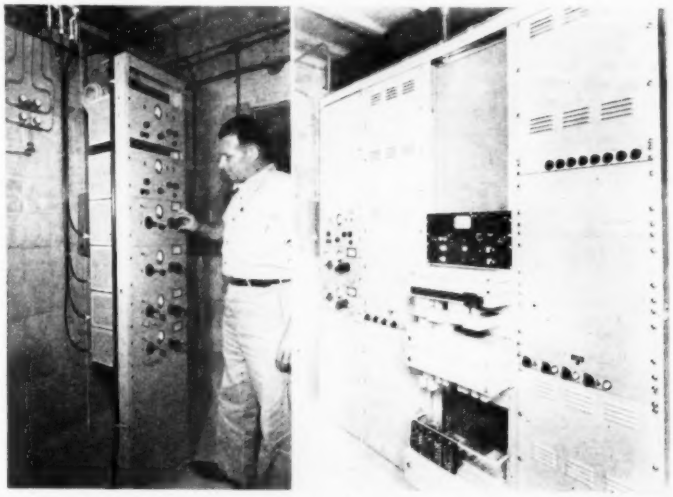


Fig. 4—(Left) Deer Path Hill repeater station; shown are the two transmitters, two receivers and associated power supplies comprising the normally unattended radio repeater installation. Fig. 5—(Right) Terminal installation at Montello, present western terminus of the Keystone radio relay system. The four bays are, left to right: RF equipment, demodulating equipment, miscellaneous signaling and voice terminating equipment, and modulating equipment. These bays include provisions for ultimate expansion to 23 voice channels.

New Medium Rig Features Mobile Console Control Unit

by Roy F. Carlson
District Editor

A NEW medium rig recently added to drilling equipment of Woods Drilling Co. marks another step in the company's rapid growth. Beginning with one rig in 1947, the company now owns four strings of tools. *(A short article describing the company's growth appeared in the Journal, May 27, 1948, page 118.)*

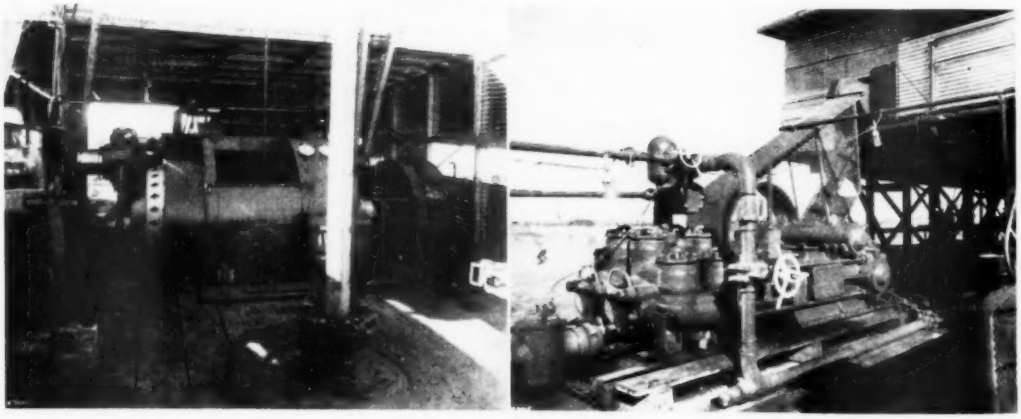
The most recent addition to equipment is a very compact medium-size unit now working in Garvin County, Oklahoma, near Lindsay, which includes a 129-ft. mast, with a draw works capable of handling 10,000 ft. of 4½-in. drill pipe. Draw works, rotating equipment, swivel, traveling block, and mud pumps are manufactured by Wheland Co. The rig has drilled one dry hole and is now drilling a field well near Lindsay.

The outstanding feature of the rig is the draw works console control unit. All control equipment is pneumatically operated. Control hoses have been gathered into a bundle, and enclosed in a flexible conduit, permitting a separate skid mounting of the control panel. By means of the novel hookup, the control panel may be moved through a wide degree, making it possible for the driller to control operations from the best possible vantage point. The driller, therefore, is always in the best position to watch the derrick man, floor man, drilling operations, and the cathead man. He can place the console in the safest position during catheading operations.

The draw works is compounded for operation from either or both of two twin diesel engines, fluid couplings at the engines being optional equipment. It has six forward and two

Above: Woods Drilling Co.'s new rig on a location in Noble County, Oklahoma. This was the rig's first job.

Right: Driller at the new console control unit, placed well away from the draw works, and facing a direction opposite to that of more conventional controls.



Below, left: Draw works and rotary table of the new rig. Note the nearly flush mounting on the rotary table and guard, and the free approach to the cat heads. Below, right: Reinforcing bars from the crank pin of the pump to the cylinder block strengthen the cradle. Bolts are eliminated on the connecting rod.

reverse speeds. Water-cooled mechanical brakes are supplied plus either dynamatic or hydromatic auxiliary brakes.

The rotary table is driven through a universal-jointed propeller shaft from the draw works. It has been designed virtually square in outline so that flooring can be fitted around it with a minimum of cutting. Also, the table guard is nearly flush with the top of the base so that the guard is nearly on the same level as the derrick floor.

Mud pump is constructed with "tie rods" between water and crank ends to reduce over-all pump weight and improve pump accessibility. Toboggan-type skid beams provide strengthening and a larger bearing surface than heretofore. It is a 7½ by 14-in. pump, and will deliver 613 g.p.m. at 838-psi. pressure at 60 r.p.m. The connecting rods are strengthened by making them one piece, eliminating connecting-rod bolts.

The swivel and traveling block are streamlined, have no exterior projections to come loose, rattle, or hang up. The narrow traveling block, with low center of gravity and special bearing construction has smooth and fast-falling operational characteristics.

Flowline Paraffin Removal

by D. H. Stormont
District Editor

KEEPING well-head flow lines free of paraffin deposits may no longer be troublesome and costly if a new removal method proves as successful in industry-wide usage as 2 years of field testing indicates it to be.

Heart of the new method is a specially developed valve through which truly soluble plugs can be injected while the well's oil production is being bypassed through a builtin orifice. After the plug is inserted, the valve is turned so that the plug is free to cruise through the flow line, pushing any soft paraffin deposits before it. The plug, being soluble in crude oil at normal well-head temperatures, then goes into solution so that it does not have to be removed.

Inserting a soluble plug in an injector valve installed on the flow line of a West Texas oil well. After the plug is in place and the aperture in the valve body closed, the valve is switched so that the soluble plug can enter the flow line.

Plugs of various types have been used in the oil industry for a number of years to scrape paraffin deposits from flow lines. These at first were either steel or wood, but more recently plugs which disintegrate have come into use. All these, however, were difficult to insert into the flow line because the well had to be shut in, or the flow diverted through a bypass, while flow-line connections were broken in order that plug could be injected.

Another difficulty, if the plugs were plastic in nature, was in preventing their being ruptured while well-head pressures were being placed upon them. All too often a surge of pressure would force them against a partially open valve, resulting in the plug being mashed out of its cylindrical shape.

The new soluble-plug injector, which can be operated without shutting down the flowing or pumping well while the plug is being injected, is a modified plug valve with a 1-in. builtin bypass. The valve plug contains an orifice the same size as the flow line. When the valve is turned to the "off' position, this orifice faces an opening in the valve body through which a soluble plug of the proper diameter can be injected (see photograph). This aperture, of course, is closed when the valve is in the "on" position, sealed by a quickly removable plug. Then when the valve is switched into the flowing position the soluble plug is positioned to move into the flow line.

Because crude continues to flow through the 1-in. bypass during the short interval of time necessary for the injection of the soluble plug, no appreciable pressure buildup occurs on the upstream side of the valve. Thus when the valve is switched to admit the plug into the flow line there is no sudden surge of crude oil to damage the plug. Likewise, because the flow line is always sealed there is no escape of crude from the line.

Field experience has shown that the method, which has been tested on flowing and pumping wells of all types in Wyoming, the Mid-Continent, and on the Gulf Coast, is successful only when used regularly. If heavy deposits have accumulated in the flow line it is necessary that the line first be thoroughly cleaned. Then if a plug is injected periodically—semiweekly, weekly, monthly, or at whatever intervals experience with the individual well dictates—paraffin deposits can never become so heavy that they will be a problem. One plug a week, or at a monthly operating cost of about $1.60, has been found sufficient in many instances.

The plug injector was developed by W. C. Gilmore, head of Kinney Machine & Manufacturing, Inc., Odessa, Tex.

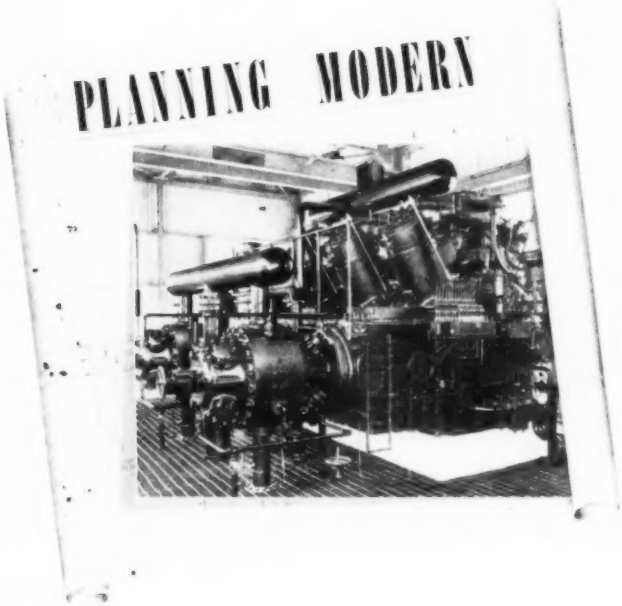


Fig. 1—Typical-gas compressor installation showing the well designed foundation and piping. Installations such as this provide reliable and efficient service.

GAS-COMPRESSOR STATIONS

by Tyler G. Hicks

ONE of the most necessary equipment installations in the oil and gas industries is the compressor—compressors being used for a multiplicity of purposes in the divisions of production, natural-gasoline manufacture, cycling, refining, petrochemical plants, and in gas pipe-line transportation. This equipment, of course, is not used "bare" nor as stripped-down units by themselves. Properly, compressors are installed in one form or another into an operational unit commonly referred to as "compressor stations."

This article is the first of a series of five installments which the Journal will publish under the series title, "Planning Modern Gas - Compressor Stations." The subject matter of the five articles will be:

1. Foundations and buildings.

2. Compressor characteristics and installation.

3. Compressor cooling.

4. Cooling equipment, air filters, and exhaust systems.

5. Safety devices and station heating.

1. FOUNDATIONS AND BUILDINGS

THE modern gas-compression station is a major factor in low-cost production and deserves careful planning. The usual planning or design problem can be conveniently divided into at least three parts to aid analysis: (1) foundations and buildings, (2) compressors, and (3) auxiliary equipment. A study of each part of the usual problem will reveal those factors which must be considered before a satisfactory station design may be obtained.

Foundations

Gas-compressor-station foundations consist of: (1) compressor supporting mat, (2) compressor foundation block, and (3) building-wall supports. The compressor supporting mat is, perhaps, the most important of all because its design and construction can affect all other members in the structure.

Basically, the mat, Fig. 2, supports the compressor foundation blocks and transmits vibrations to the earth. The mat may be a solid slab of reinforced concrete (A) resting on rock, a keyed concrete slab, (B) resting on loose soil, or (C) a pile-supported slab in regions where fine wet sands or soft clay soils are encountered. In all cases, the mat must be anchored to prevent vibration or movement. Typical safe loads for various soils are summarized in Table 1.

Tyler Hicks, mechanical engineer, has his own practice in New York City. He specializes in mechanical design for refinery and natural-gas contractors. Prior to setting up his own practice in 1948, he spent 4 years as mechanical engineer with Lockwood Greene Engineers, Inc., New York, where one of the projects he worked on was the Whiting, Ind., plant of Standard Oil Co. (Ind.). A member of A.S.M.E. and Tau Beta Pi, he received his engineering degree from Cooper Union School of Engineering, New York, in 1935. Hicks has written a number of articles on refinery and natural-gas-plant design and operation. For several years after receiving his degree, he sailed on Standard Oil and Pan American tankers as engineering officer. Prior to going into design work, he was employed as still operator in Baton Rouge, and was gas-compressor-station operator in Texas and Ohio.

The extent of the mat within the compressor building is important. A clearance of at least 1 ft. between the building-wall foundation and mat edges must be provided. Extension of the mat below the building foundation or butting the two structures are dangerous practices because engine vibrations may quickly destroy the building wall. Good construction entirely isolates the compressors from the building structure and, to date, the independent type of mat is the best means for achieving this. Minimum allowable mat thickness is usually taken as 1.7 times its extension beyond the compressor foundation.

Compressor foundations.—A compressor foundation block must perform two important functions: (1) maintain the compressor unit in

alignment and at the proper elevation, and (2) transmit all vibrations to the mat. A poorly constructed compressor foundation block can cause almost as much operating trouble as an incorrectly built mat.

The usual compressor foundation, Fig. 3, consists of a solid, poured concrete block keyed to the mat. When properly keyed and reinforced, the compressor foundation block and the station mat act as a unit, absorbing all vibration and maintaining the individual compressors in correct alignment. Therefore, a sufficient number of steel reinforcing bars must be used in the joint between block and mat. In addition, the mat must be cleaned and wetted before the block is poured, otherwise the joint may not be strong enough to resist vibration.

Modern gas-compressor stations usually contain from 2 to 18 reciprocating compressors or several centrifugal compressors. The mat type of construction is ideal where reciprocating compressors are used because individual-unit vibratory forces are all transmitted to the mat. Since many of the vibratory forces are equal and opposite, or nearly so, they tend to cancel each other. Mass movement of the foundations is thereby prevented and there is little transmission of unbalanced forces to the compressor building or nearby structures. Positive prevention of vibration and unbalanced forces is necessary if compressor and nearby buildings are to operate for sustained periods without trouble. Calculation of vibratory forces produced by a given compressor is usually beyond the scope of compressor station design because complete details of compressor dimensions and weights of various parts must be known. Hence, when in doubt, it is common practice to refer the problem to the manufacturer. However, extensive compressor experience shows that when the total mass of the equipment and concrete is 15 to 20 times the value of the disturbing force, little difficulty will be encountered.

Block shape.—As shown in Fig. 3, several conditions must be met by the block. Its base area, Fig. 3A, must be sufficient to prevent overloading of the concrete mat beneath. Insufficient base area may cause cracks in the mat. To prevent unequal stresses in the mat, the compressor block area should be distributed to provide nearly uniform loading on the mat. Thus, when the compressor center of gravity is located nearer one end of the unit, the block at this end must be extended to distribute the load over a greater area of the mat, Fig. 3B. Such an arrangement will prevent tipping of the block.

Light foundations, Fig. 3C, tend to slide back and forth during compressor operation. Although the reinforcing steel will usually prevent block movement, the rods will be strained and may eventually break. This condition frequently occurs when block mass is made less than that recommended by the compressor manufacturer. In stations where the mat is omitted and the compressor block rests on soil, there have been cases of block settlement at one end, Fig. 3D. The usual cause of this condition is unbalanced reciprocating and vertical forces. The horizontal unbalanced reciprocating force and the vertical force have a resultant which must fall within the base area of the block. If it does not, the block will settle at one end or may even topple. Extension of the base area to a point a little beyond where the resultant is included is therefore necessary.

About 80 per cent of the gas-compressor stations under construction today are fitted with basements. Temporary stations are about the only type which are not equipped with basements. Worth-while savings in structural costs and increased convenience for operating personnel can be obtained by using the compressor foundation block in lieu of columns for station floor support. To secure the necessary support, the block is notched all around, as shown in Fig. 3A. The floor beams then rest on the block with insulating material between the two to prevent transmission of vibration to the floor. Operators are much in favor of this arrangement because they can move freely about the basement without the interference of building columns.

Wall foundations.—Most modern compressor-station walls below ground level are concrete. The width of the footing required by the wall

Fig. 2—Mat constructions commonly used for gas compressor stations. (A) Simple block mat resting on hardpan or rock. Cork or other vibration absorption materials are usually placed between the bottom of the mat and the rock. (B) Keyed construction common in areas having loose soil. (C) Pile-supported mat. Batter piles should slope inwards toward mat center as shown.

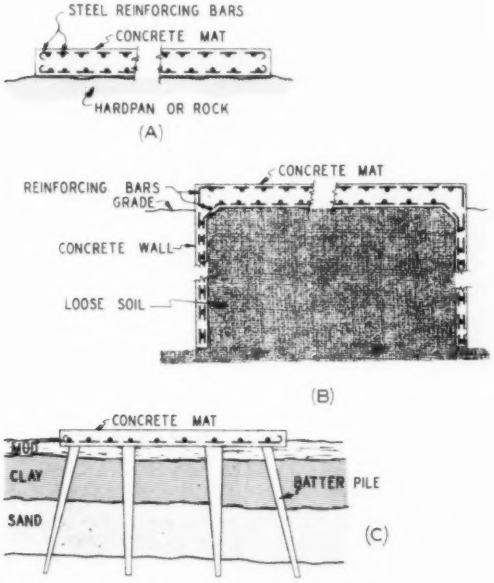


Fig. 3—Various troubles which develop with compressor foundation blocks. (A) Insufficient base area causes cracks in the mat. (B) Unequal distribution of base area may cause block to settle. (C) Light foundations will tend to slide with resulting strain on reinforcing bars. (D) Resultant of forces acting in compressor should fall within the base area of the block.

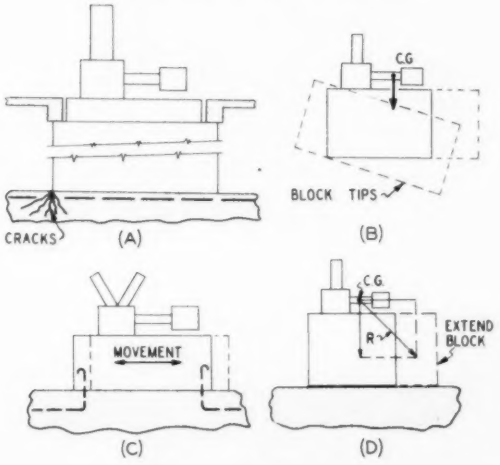


TABLE 1—SAFE SOIL LOADS

Type of soil—	Tons per sq. ft.*
Quicksand and marshy soils	0.5 to 1.0
Clay, soft	1
Wet sand, confined	2 to 3
Clay, thick beds which can be spaded	2 to 4
Coarse, loose medium, and dry sand	3 to 4
Gravel and coarse sand in well-compacted beds	4 to 5
Hard clay in thick beds	4 to 6
Gravel and sand requiring a pick for removal	5 to 6
Soft rock, pliable as shale	5 to 10
Gravel and sand, or hardpan	8 to 10
Solid shale or medium rock	10 to 15
Native rock ledge such as granite	25 to 100

*Soil loadings greater than 15 tons are seldom used because the maximum safe load of concrete in compression is approximately 15 tons.

is determined by wall height, width, allowable soil-bearing pressure, and load on the wall above grade. The load on the wall, which is an important consideration in footing design, consists of the compressor-station steel framework, a brick wall which may be built from grade up to the window sill level, and the corrugated transite wall and roof above. For small buildings, the wall footing need not be reinforced if the thickness is made twice the footing projection. In larger footings, reinforcing steel is used at the bottom, Fig. 4A. To save concrete in large footings, the top surface may be sloped downward away from the wall, Fig. 4B. In no case should the footing or wall surface be in contact with, or underpinned by the mat. The mat should

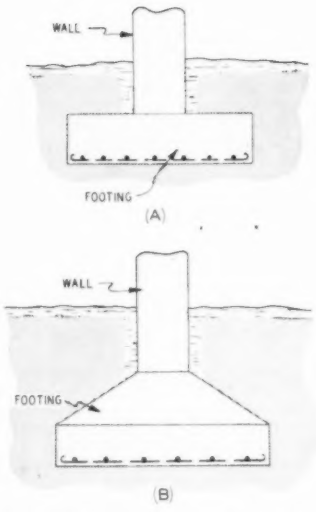


Fig. 4—Wall footings commonly used in gas-compressor-station construction. (A) Reinforced footing for heavy wall. (B) Large footing construction which saves concrete costs.

end at least 1 ft. from the wall or wall footing.

Soil conditions.—Thorough subsurface soil investigations permit intelligent and economical design of compressor-station foundations. Bearing-capacity tests made with small plates may be sufficiently accurate for moderate-size temporary stations but for larger, permanent stations, the data secured from such tests are not sufficiently accurate. Fig. 5 shows two typical instances where small plate tests would be erroneous.

In Fig. 5A, unequal settlement of the compressor station most probably would occur if the allowable unit pressures on the foundations were based on the results of a small-plate test. This would be caused by the difference in thickness of the soft clay across the building foundation. The small-plate test would probably not reveal clay thickness difference for two reasons: (1) duration of the test is too short, and (2) soft clay is often located below the plane of negligible stress on a small loaded area.

In Fig. 5B, the pressure produced on the soft stratum by the test plate would be extremely small whereas the extended structure of the gas-compressor station would produce a much greater pressure. Settlement would occur at some time during the useful life of the building. Test pits, test rods, auger borings, wash borings, core and churn drills are far better tests for permanent structures than is the small-plate test.

Piling.—Wood, concrete, or steel piles can be used for station foundation and mat support. The type to be used depends on a number of factors such as soil conditions, capital available for station construction, and driving equipment available at or near station site. Timber piles may

(Continued on page 122)

Fig. 5—Soil conditions which may cause building to settle. (A) The soft clay below the firm sand and gravel would not show up in small plate bearing tests. (B) The soft clay stratum, when acted upon by the larger area of the station building, would cause settlement.

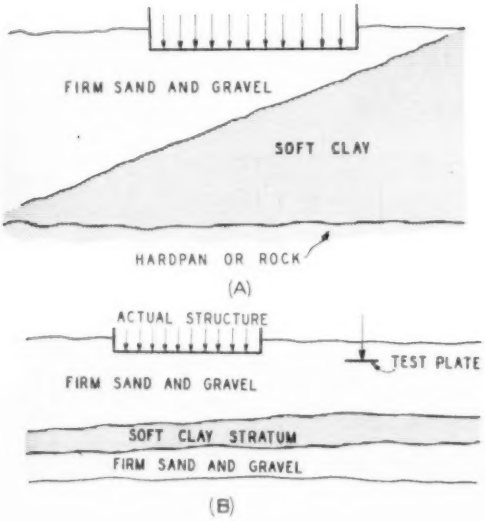
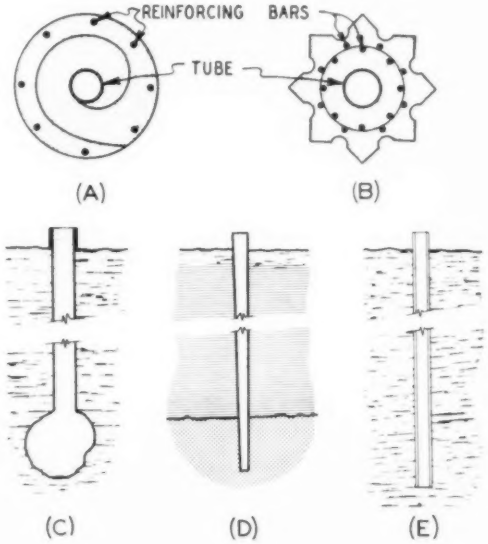
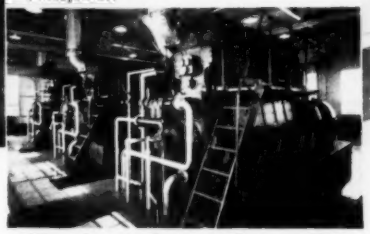


Fig. 6—Pile constructions commonly used in gas-compressor stations. (A) Precast concrete pile, (B) octagonal concrete pile, (C) cross-section of cast-in-place concrete pile, (D) timber pile, and (E) steel "H" pile.

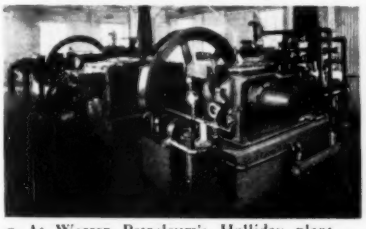


LEADERS GET TOGETHER...

● Line-up of GMV's in Warren Petroleum's Antioch plant where these and 4 additional GMV's total 10,400 compressor horsepower.



● These three 505 hp Cooper-Bessemer JS-6 gas engines drive lean oil pumps in Warren Petroleum's Maysville plant.



● At Warren Petroleum's Holliday plant, Cooper-Bessemer 4 cylinder twin-line pumps, driven by Cooper-Bessemer 150 hp GAW gas engines, are in gasoline work, each handling up to 14,500 bbl of lean oil a day at 800 psi.

for modern, highly efficient operation

Warren Petroleum Corporation, pioneer in gasoline extraction, has been long recognized as a leader in the natural gasoline industry. Recent plant expansions and processing advancements, aimed at greater propane recovery, contribute to the company's truly enormous field processing operation and help assure continued leadership.

The modern compressors, engines and pumps shown here are part of Warren Petroleum's most recently added facilities. They are now serving in various phases of the Company's gasoline work and pressure maintenance. All are Cooper-Bessemer units, built by a company likewise recognized as a leader in its field . . . *for over a century!*

When planning your power, compressing and pumping needs, be sure to check with Cooper-Bessemer on the new features, new developments that continue to uphold this kind of leadership.

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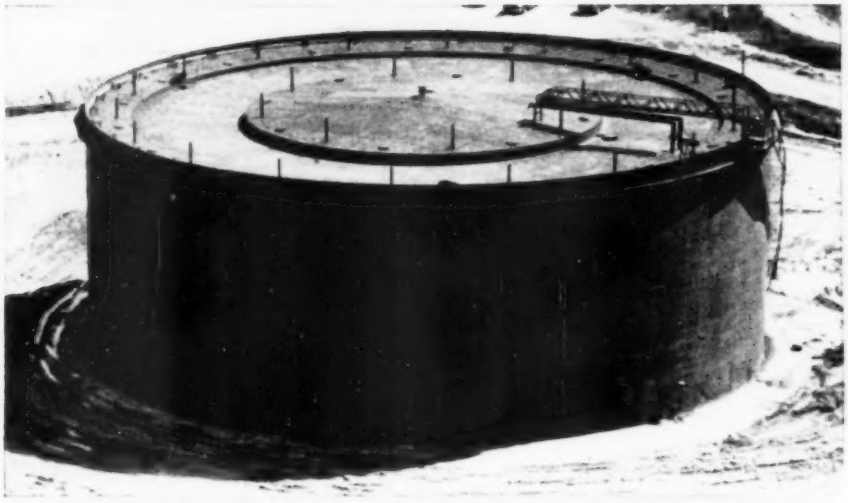

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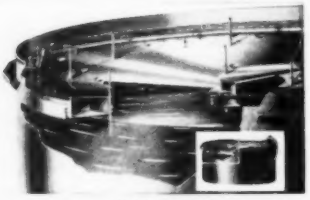

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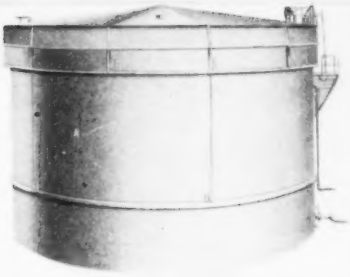

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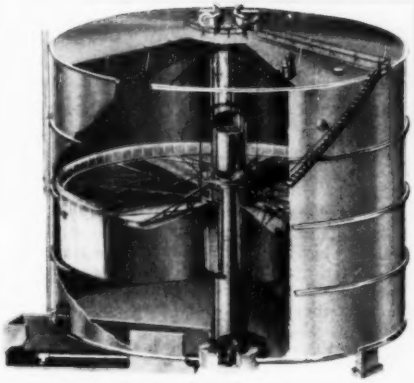

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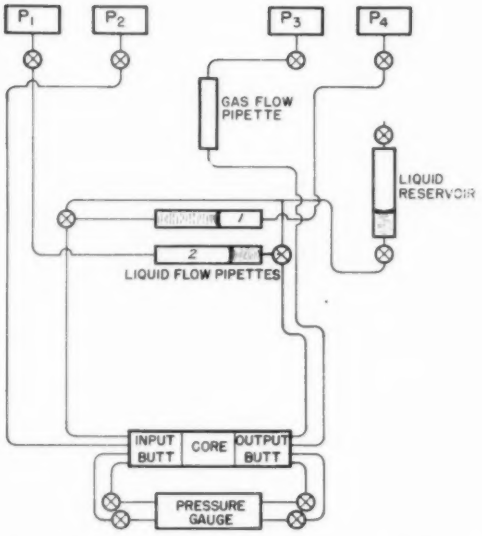

Fig. 1—Flow diagram of capillary-pressure relative-permeability apparatus. Enlargement of the core holder is shown in Fig. 2

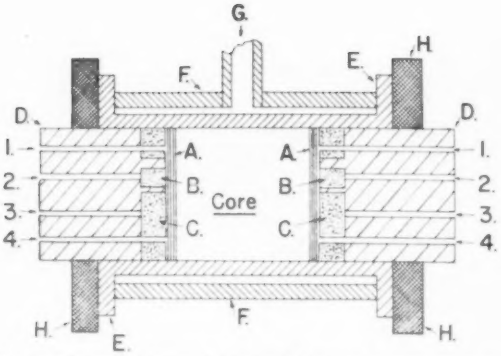

Fig. 2—Schematic diagram of the core holder used in capillary-pressure permeability determinations. Numbered and lettered parts are as follows:

A. Kleenex tissue capillary contact material.
B. Pressure tap for wetting phase—porous ceramic material.
C. Semipermeable membrane—porous ceramic material.
D. Lucite butt pieces.
E. Rubber sheath of Hassler-type core holder.
F. Metal cylinder of Hassler-type core holder.
G. Pressure applied to sheath to hold core and butts.
H. Metal face plate of Hassler-type core holder.
1. Flow channel of nonwetting phase—through lucite and ceramic.
2. Pressure tap for wetting phase.
3. Flow channel for wetting phase—to under side of ceramic.
4. Pressure tap for nonwetting phase—through lucite and ceramic.

Laboratory Determination of

Relative Permeability

by E. R. Brownscombe,* R. L. Slobod,* and B. H. Caudle*

PART 2

THE first part of this article, containing a description of the three important mechanisms used to determine relative permeabilities of core samples, appeared in The Oil and Gas Journal issue of January 12. These three mechanisms—capillary-pressure displacement, dynamic displacement, and solution-gas displacement—were compared in this first part as to application and results.

This second and concluding part of the paper discusses equipment used in determining relative permeability by a capillary-pressure-displacement apparatus and describes the operation of and the results obtained with this equipment.

IN the development of the apparatus and method for the determination of relative permeabilities by the capillary-pressure desaturation method, the general aim was to develop a system similar to that described by Hassler,[1] but one in which two phases flow simultaneously through the core sample with the same pressure differential between the phases being maintained at all points in the core in order to assure uniform saturation and to avoid end effects. The permeability to each phase is measured at various saturation values.

In order to carry out the desaturation of the core by this method, the nonwetting phase must be in contact with the sample and under a higher mean pressure than that acting on the wetting phase within the core. Under these conditions the displaced wetting phase passes through the semipermeable membrane mounted in capillary contact with each end of the core. In addition, at the ends of the core means are provided for the flow of the nonwetting phase into and out of the sample.

The two phases are kept in completely separate systems, joining only in the core sample, in order to measure the flow rates of each phase, to determine the saturation value by a material balance method, to control the pressure gradient, and to maintain a uniform pressure differential between the phases. Also necessary is a method for the accurate measurement of the pressures exerted by each phase at the two ends of the core, using gages with volume displacements small enough not to introduce an appreciable error in the measurement of the saturation value of the sample.

Description of apparatus.—Fig. 1 is a flow diagram showing the paths of the fluid phases through the core and measuring devices.

The gas pressures (P_1, P_2, P_3, and P_4) which control the fluid flows and pressure differentials, are obtained either by the use of a series of water and mercury manostats or with precision-type pressure regulators. These gas pressures are transferred to the flowing liquid phases at the gas-liquid interfaces in the liquid flow pipettes.

The wetting phase flows through the core from pipette 1 and into pipette 2. In this process pipette 1 is emptying from the zero point and pipette 2 is filling from the zero point as shown in Fig. 1. When pipette 1 is empty and pipette 2 is full, the flow is momentarily interrupted so that pipette 1 can be refilled and pipette 2 emptied, using the liquid reservoir for both the supply and storage of liquid. In this way the total volume of the liquid in the system is kept constant throughout the study. The flow rate of the wetting phase, when the core is at equilibrium conditions, is obtained from the pipettes 1 and 2, which can be read to approximately 0.001 ml.

The desaturation of the core is determined from the increased volume in the reservoir pipette after the flow pipettes are set at zero. The gas phase is fed directly through the manifold from the manostats to the core sample, with the output gas being passed through a vertical gas flow pipette. The walls of this pipette are wet with an aerosol solution, and a small amount of the solution is retained in the bottom of the pipette to form

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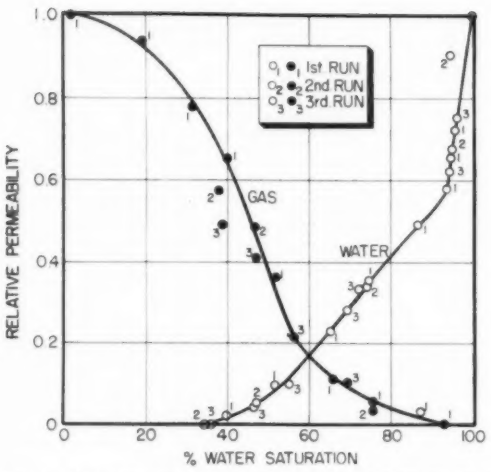


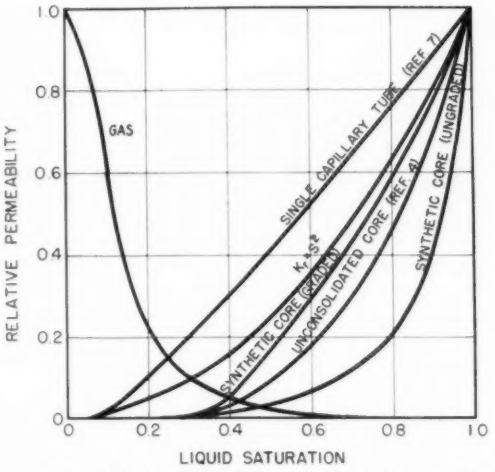


Fig. 3—(Left) Three relative-permeability determinations on the same sample, showing the reproducibility of results with the capillary-pressure apparatus. Fig. 4—(Right) Comparison of experimental curves. The gas curve is drawn from data taken with a single capillary tube. One theoretical curve is represented, $K_r = S^2$

bubbles which travel up the pipette as gas flows through. By timing the travel of these bubbles up the tube, the rate of gas flow is readily measured.

The pressures exerted by the phase at each end of the core are measured by a pressure gage connected to taps at the faces of the core. From these four pressures the pressure drop across the core and the pressure difference between the phases may be calculated. The pressure gage used is of the metal diaphragm type, incorporating an electronic circuit with a variable d.c. output voltage which may be read on a potentiometer (recording or manual type).* The gage has a volume change of about 1 cu. mm. per psi. applied pressure.

The core sample, approximately 2 cm. in diameter and 2 to 3 cm. in length, is held in a Hassler-type holder consisting of a rubber sleeve inserted in a metal tube and compressed around the sides of the core by air or water pressure (Fig. 2). Butt pieces made of lucite faced with a porous material are placed at each end of the core to conduct the flow and separate the phases. An unglazed porcelain such as Coors No. 750 or Selas No. 02 is the porous material generally used in the construction of these pieces. The wetting or external phase flow is conducted to and from the core faces through the porous material.

An isolated button of the same porous material allows the pressure of the wetting phase to be measured at each end of the core. The nonwetting phase flow path is connected directly to the faces of the core by holes drilled through the porous diaphragm, and this phase is somewhat uniformly distributed over the cross-sectional area of the core by grooves cut in the face of the ceramic. The pressure taps for this phase are also drilled through to the core faces. A layer of ordinary cleansing tissue is used to insure capillary contact between the faces of the core and the porous diaphragms.*

Thus, two-phase flow may be conducted through the core samples with the phases being separated outside of the sample as long as the pressure on the nonwetting phase is higher than that on the wetting phase at each end of the core. The four pressures are set to give the pressure difference between phases and the pressure differential across the core necessary to produce the desired saturation and flow rate in the core sample. When a system is used in which water or brine is a flowing phase, the faces of the contact butts are made of the naturally water-wet ceramic materials, but if the phases are oil and gas (with or without connate water present as a static phase), the porous material is made preferentially oil-wet by treatment with a suitable agent.†

Operational procedure.—If, for example, an oil-gas system is used with a core sample containing no connate water, naphtha and air are the flow-

*Trimont Series "N" Differential Pressure Gage or Electro Pressuregraph Model 3700A with modified output circuit.

*A paste of a finely divided substance, such as infusorial earth, might also be used for this purpose, but experimental work has shown that the fluid flow will carry and deposit particles of this material into the capillary system of the core, and thus change the pore structure and the relative permeability values of the sample.

†G. E. Drifilm No. 9977 or D. C. No. 1107 Silicone.

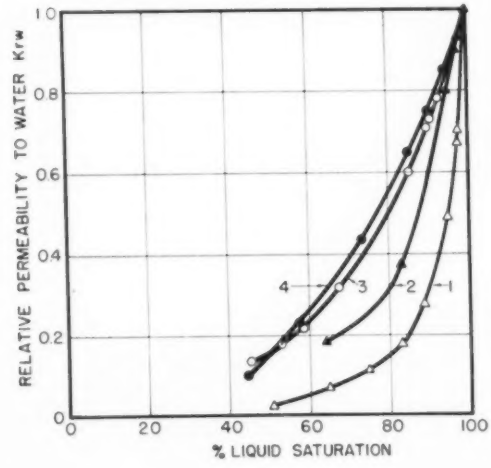
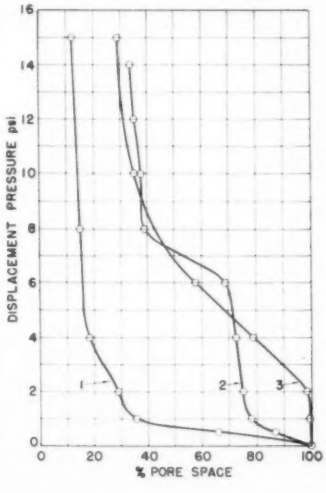
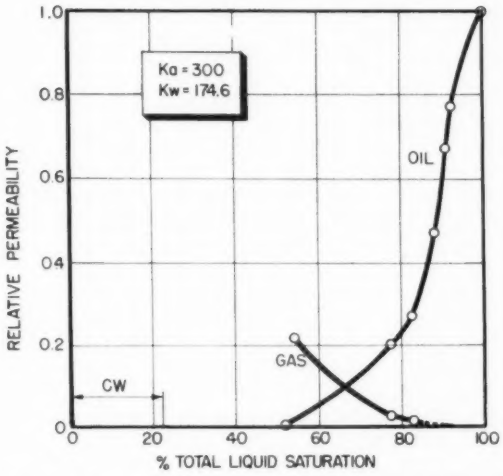


Fig. 5—(Left) Effect of plugging on a core sample by infusorial earth used on the butt-piece contacts

Fig. 6—(Right) Capillary pressure curves of three reservoir sandstones





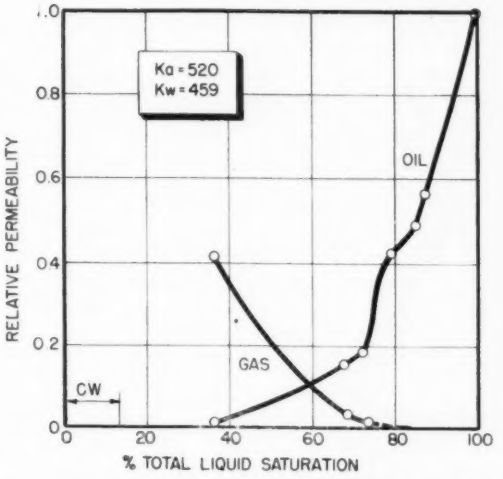


Fig. 7—(Left) Capillary-pressure relative permeability of a reservoir sandstone. Sample contains bentonite. Fig. 8—(Right) Capillary-pressure relative permeability of a reservoir sandstone. Sample contains little bentonite

ing phases, and contact butts containing either preferentially water-wet or preferentially oil-wet porous diaphragms may be used to conduct the wetting phase flow. The core and contact butts are saturated with naphtha under vacuum and the weight of the saturated core is compared with the dry weight to determine the porosity. The core and butts are then mounted in the Hassler-type holder as shown in Fig. 2, and the flow lines and pressure taps are connected to the core assembly by means of small-bore plastic tubing.

The pressure of the naphtha phase on each end of the core is set to produce a flow through the core. The air pressure on each end of the core is set to reproduce the same pressure drop across the core sample as that in the naphtha phase, which at the same time maintains a uniform pressure difference between the phases at all points in the core. The air pressure is always kept at least several hundredths of a pound over that of the naphtha in order to keep the phases in their respective flow channels in the butt pieces.

Since this small pressure difference between the phases is not usually enough to desaturate the core, no air will flow. Consequently, a measurement of the naphtha flow rate and pressure will give the effective permeability of the core at 100 per cent liquid saturation by the application of Darcy's law.* In cores partially desaturated by such small pressures the specific permeability (same as the effective permeability at 100 per cent saturation) of the core to naphtha may be obtained with a liquid permeameter and the value used as a check on, or in place of, that obtained in the relative-permeability apparatus.

*Darcy's law:

$$K = Q\mu L / PA$$

where
Q = flow rate in cc. per second
μ = viscosity in centipoises
L = length in cm.
P = pressure across core, atmospheres
A = cross-section area of core in sq. cm.
K = permeability in darcys

The gas pressures are then changed to raise the pressure difference between the phases and thus reduce the saturation in the core by emptying the pores having a capillary pressure lower than the applied pressure difference between the phases. These gas pressures are again adjusted to impose the same pressure gradient across the core as that produced in the naphtha phase. The core is allowed to come to equilibrium under these conditions before flow rate measurements are made. The approach to an equilibrated saturation condition is followed by observing the flow rates of the naphtha phase into and out of the sample.

Until a saturation equilibrium is reached, the flow out of the core will be the faster of the two, but at an equilibrium condition equal flow rates will be observed. When the pipettes conducting these flows (pipettes 1 and 2 in Fig. 1) are reset at zero, the volume of naphtha displaced from the core since the last setting may be read in the liquid reservoir pipette, and from these data the saturation value of the core at this point may be calculated. The naphtha flow rate is again measured and the effective permeability for the partial saturation value is calculated. From this the relative permeability is calculated.

If gas is flowing is a measurable quantity, the rate is determined on the vertical gas flow pipette with aerosol bubbles. Similar calculations give the relative permeability to gas values for this same saturation, using the specific permeability to water as a basis for the calculation.

The gas pressures are again raised in order to desaturate the core further, and relative permeability values for this new saturation value are again determined. This stepwise procedure is carried on until the amount of naphtha in the core can no longer be appreciably reduced by increasing the pressure difference between the phases; at this point the relative permeability to naphtha will be approaching zero. The core sample is removed and weighed to determine accurately the final saturation value. From this final value the experimentally observed saturations as obtained from the reservoir pipettes throughout the determination may be corrected if necessary.

The remainder of the gas relative permeability curve (from residual naphtha to 100 per cent gas saturation) can be obtained, if desired, by the use of a gas permeameter. Since the liquid saturation cannot be reduced by flow, heat and vacuum are generally used to reduce the saturation of the liquid phase. The relative-permeability data obtained are plotted as a function of the liquid saturation, and curves for both the liquid and gas relative permeability values are drawn as in Fig. 3.

When an oil-gas system is used with a core containing connate water as a static phase, contact butts having preferentially oil-wet porous diaphragms must be used in order to prevent any flow of water out of the core and into the oil flow system. The procedure used with this three-phase system is identical to that discussed for the oil-gas system except the sample is originally saturated with oil and connate water. The resulting relative permeability curves are plotted as a function of total liquid saturation, and the specific permeability to water is again used for the calculation of the oil relative permeability values.

Reproducibility of the results.—The data plotted in Fig. 3 are the results of three determinations on a single core using a fresh water-air system and show the reproducibility obtained in this method, with the run numbers beside each data point.

The largest source of error in relative-permeability measurements of this type is in the measurement of the pressures acting upon the core to produce the fluid flow. Since the accuracy of the pressure-measuring device used was 0.01 psi., and the pressure gradient necessary to induce a measurable flow decreases with increasing effective permeability, it is apparent that the experimental error in the relative permeability values will be greater for cores of high permeability and in the region of high relative-permeability values. Thus, errors up to 10 per cent of the value have been experienced on the more permeable cores at high relative permeability, while in the range below 0.1 relative permeability the largest errors observed have been less than

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3 per cent of the number. The determination of the saturation value for any relative permeability point is within approximately 1 per cent of the pore space.

There is also some question as to the validity of the wetting phase relative-permeability values in the region above critical gas saturation based on the theoretical consideration that the nonwetting fluid must flow in order for desaturation to take place, whereas literal interpretation of the curve precludes this. However, it is possible that the nonwetting phase is flowing at these higher liquid saturations, but at a rate too small to measure in the apparatus.

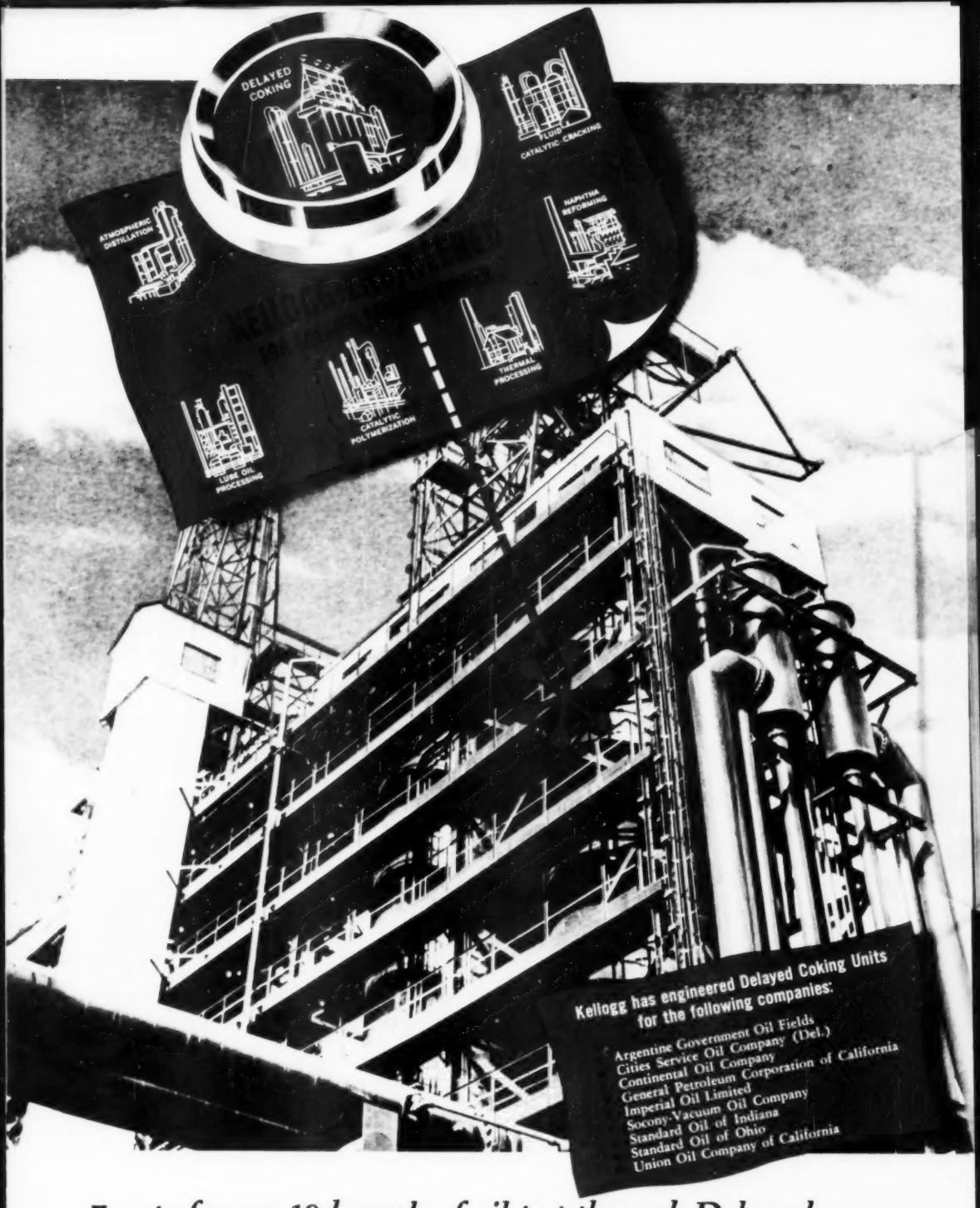
Experimental limits of the apparatus.—The apparatus now in use is capable of producing pressures up to 15 psi. on the nonwetting phase and pressure gradients up to several pounds for producing flow through the core. Except for very impermeable cores this will produce a pressure difference between the phases great enough to reduce the sample to a wetting phase relative permeability value of approximately zero. The limits in terms of permeability of samples that can be used with this method are not exactly known, but limestone cores with permeabilities as low as 1 md. and sandstone cores with permeabilities as high as 600 md. have been successfully used.

Discussion of Results

Since the relationship between fluid flow rate and saturation in a porous medium is essentially a capillary phenomenon, it is evident that any theoretical considerations leading to, or interpretations of relative permeability data must be looked upon from this angle. The simplest case of flow in such a system would be in a single capillary tube. Martinelli, Putnam, and Lockhart[7] present curves giving relative-permeability data for the two-phase flow through such a tube (Fig. 4). In this plot the change of the wetting-phase permeability with saturation follows essentially a straight line to the 10 per cent saturation value, where it curves sharply toward a zero value. A curve for the nonwetting phase would increase slowly with decreasing wetting-phase saturation at first and then increase rapidly, approaching a relative-permeability value of unity.

Fig. 4 also shows a set of relative-permeability curves, obtained with the method described in this paper, for a synthetic core made of fused alundum and in which the alundum grains were nearly uniform in size, tending to produce capillaries in the sample also of uniform size. The relative permeability of the wetting phase for this core also decreases almost linearly with saturation but ap-

(Continued on page 123)



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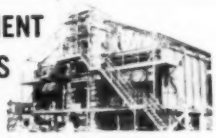

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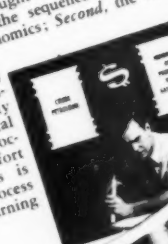

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by R. B. Tuttle
Associate Editor

The new thermal reforming unit. In this view of the plant the fractionator and stabilizer columns are in center foreground. A portion of the new heater for the reformer is shown left. Equipment on the right is operated in connection with the refinery's thermal cracker.

REVISIONS recently made in the processing layout of the Cushing, Okla., refinery of Midland Cooperative Wholesale, have stepped up the plant's crude-oil capacity by more than 50 per cent. The new processing scheme also provides wide flexibility in individual unit and over-all operations. Prior to its revamping the plant was rated nominally at 4,000 bbl. per day on an input basis. Now input design capacity is 6,500 bbl. of crude oil daily.

Except for a new 1,400-bbl. per day thermal reformer, revisions consisted generally of revamping existing units. A number of new auxiliary facilities including cooling-water and fire-protection systems, control room, electric desalters, blowdown and flare arrangement, and change house were also a part of the expansion and modernization project.

Revised crude unit.—Major revisions to the flow scheme of the original crude-distillation unit involved the addition of a 6 by 45-ft. preflash tower and heat-exchange equipment for heating the feed stream. A new crude-oil pump and new kerosine stripper were also added. The desalting equipment, consisting of two Petreco units, is tied into the feed line to the crude unit after it leaves the new charging pump. Process flow as now operated is shown in the accompanying diagram.

To provide the required heat in the preflash tower in addition to that brought into the tower with the feed, a portion of the bottom stream is returned to the tower, after passing through a heater en route to the main fractionator. The return of these bottoms to the preflash tower is regulated by a temperature controller located in the bottom section of the tower.

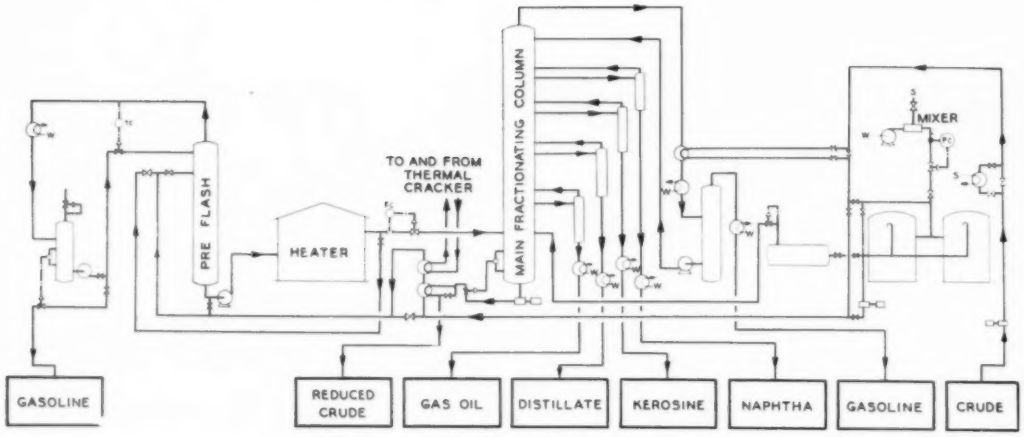
The net make of overhead material from the preflash tower, which represents approximately 17 per cent of the refinery's gasoline make, is sent to storage before further processing or blending.

Alterations to the main fractionator, a 6 by 85-ft. vessel, consisted of replacing its original cast-iron caps with modern type stainless-steel caps and complete rebuilding of the column's internal construction. This 32-plate fractionator formerly operated at approximately 15 psig. pressure drop for a 4,000-bbl. per day throughput. With the new caps the over-all pressure drop is approximately 2 psig. for 6,500 bbl. daily throughput.

Heat exchange.—Reduced crude from the main fractionator is pumped through a G-Fin unit counterflow to the incoming crude oil charge stream and then is run to storage via a submerged coil cooler. The raw-crude charge to the preflash tower is heated by means of several steps of heat exchange, first against the overhead vapors from the crude-unit main fractionator, secondly by exchange with the reduced crude from the crude-fractionator bottom to storage, and finally securing still more heat from the cracked residuum leaving the thermal cracking unit.

The side streams from the main fractionator, all of which are run to external strippers, consist of gas oil, distillate, kerosine, and naphtha. Overhead from the main fractionator is gasoline for charging the reformer.

Increased thermal cracking capacity.—By incorporating a second reaction chamber into the existing thermal cracking plant, input capacity was boosted approximately 20 per cent. On a nominal basis the capacity of the original thermal unit was



Flow arrangement of the crude-oil distillation unit.

1,600 bbl. daily. The new chamber operates in series with the chamber initially employed in the unit. The additional capacity achieved without increase in utility requirements.

Operations of the revised thermal cracking unit may be coordinated with that of the new reforming installation to provide, in essence, a two-coil selective cracking operation. This arrangement is accomplished by employing a side-cut stream from the cracking unit fractionating column as cracking stock for the new reformer.

New 1,400-bbl. daily reformer.—On a design basis the new reformer is set up to process 1,400 bbl. per day of Mid-Continent naphtha. When operating in cracking service in connection with the revised thermal unit, the new reformer will process approximately 500 bbl. per day of cracked side cut from the cracker. This scheme permits operating to ultimate gasoline yield. In this operation and in naphtha-reforming operations, the net make stream from the fractionating column bottom is flashed into the flash chamber of the thermal cracking unit. Receiver gas, produced in either of these operations, is run to the cracking unit absorber.

Throughput and Yields

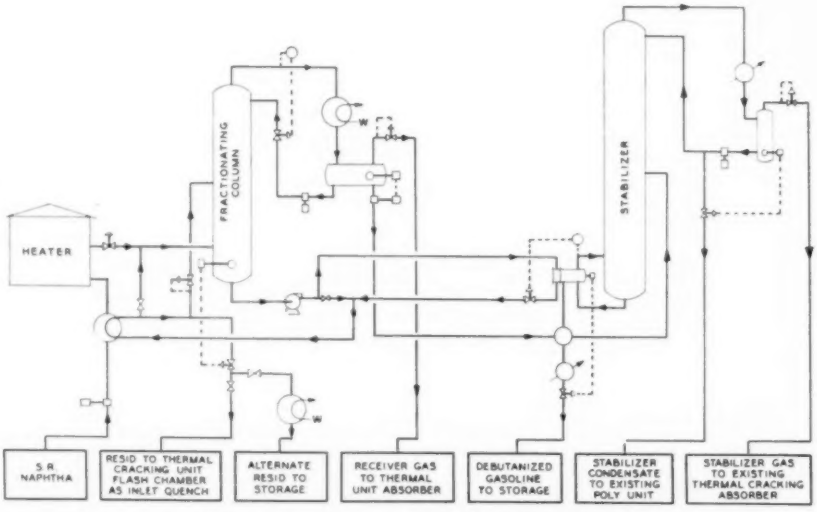
Throughput and approximate yields, on a design basis for normal reformer operation when charging naphtha are:

	Gravity A.P.I.	Rate Bbl. daily	Volume per cent	Weight per cent
Naphtha charge	52	1,400	100.0	100.0
Debutanized gasoline (400° F. E.P.)	53	1,035	74.0	73.4
Flashed residuum	16	50	3.5	4.4
Butane and lighter gas				22.2

Quench oil to the heater transfer line is obtained from the bottom of the fractionating column. This same stream supplies heat to the stabilizer reboiler and is employed to preheat the naphtha charge coming from storage. The order which the stream's heat is utilized before it serves as transfer line quench, is first to the stabilizer reboiler and then to preheat naphtha.

Debutanized gasoline is produced from the reforming unit stabilizer as net make from the bottom of the tower. Condensed overhead material from the stabilizer is charged to the polymerization unit. The recovery of liquid C_3-C_4 polymerization unit feed is such that under normal circumstances sufficient fuel gas remains for operating the refinery. The polymerization unit is being revamped to handle the resulting increase in poly feed.

The engineering design for the refinery's modernization and enlargement was made by Universal Oil Products Co., Chicago. Refinery Engineering Co., Tulsa, was the major construction contractor on the project and engineers of that company designed the crude-oil distillation unit.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ALTERNATE RESID TO STORAGE
RECEIVER GAS TO THERMAL UNIT ABSORBER
DEBUTANIZED GASOLINE TO STORAGE
STABILIZER CONDENSATE TO EXISTING POLY UNIT
STABILIZER GAS TO EXISTING THERMAL CRACKING ABSORBER

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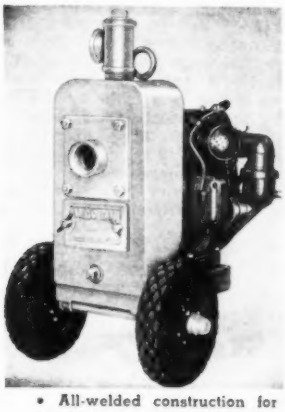

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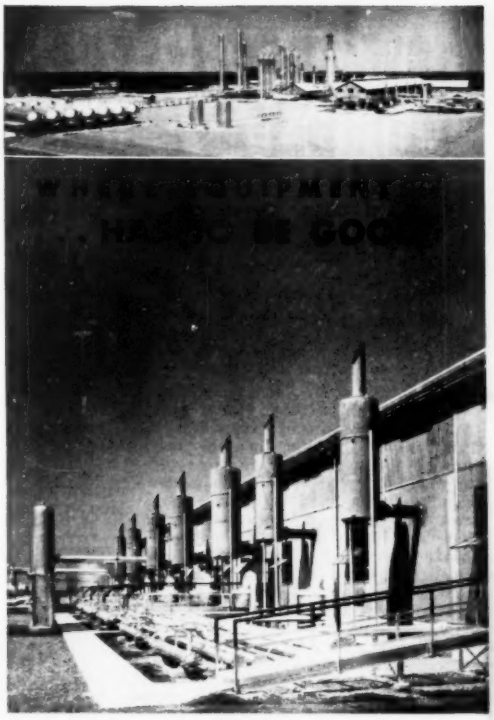

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New Insert-Type Oil-Well Pump Undergoing Tests

by Prof. C. M. Davis*

IT is estimated tha approximately 90 per cent of all oil wells in the United States are now operating on some type of mechanical lift. One must therefore conclude this is one of the most important factors of petroleum-production practices.

From the crude beginnings in pumping methods have come the modern efficient procedures of today. This has been brought about by improving the mechanical features of the pumping cycle, both in the kinds of materials used and in the improvement of engineering-equipment design. This progress has been made possible through the joint efforts of the engineering departments of pump manufacturers, production departments of oil companies, and ambitious individuals skilled in the knowledge of solving pump problems.

Consideration of the basic principles underlying and controlling the behavior of the subsurface parts of rod and tubing pumps, and applying the results of field practice have evolved further improvements in the design of equipment, have given additional data for the solution of many pumping problems, and have made possible setting of standards for economical operations.

A new insert pump, designated as type "M," has been in process of development since 1933 when Douglas Gall, of Taft, Calif., went into the pump business for himself. During the last few years Gall and his son have developed a unique top lock for their new pump. It is the purpose here to discuss certain interesting points on the type M insert oil well pump. Some engineering work is being conducted at Missouri School of Mines in order to establish definitely the correct way to determine the efficiency of the new pump.

New Type Rod Pump

The rod or insert pumps may be classified as to the following types: bottom lock traveling barrel, bottom lock traveling plunger, top lock traveling plunger, and top lock traveling barrel.

During the development period of this type M pump (see Fig. 1) it was realized the pump must be made adaptable to varying well conditions. Every attempt has been made to employ standard types of pump parts so as to attain a high degree of standardization. There have been between 300 and 400 successful installations of this pump during the last several years handling oil varying in A.P.I. gravities from 8° to 45°. It is rather unusual for an insert pump to be successful on very heavy-gravity oils. The pump to date has been made in three sizes (2, 2½, and 3-in.), and consists of three component parts, the plunger, liner, and valve sections.

The traveling valve being located on the traveling barrel affords the possibility of employing a larger valve. A larger valve system can be used when it is integrated with the barrel. It is considered the larger valve system can permit the passage of more abrasives at a decreased linear velocity and thus minimize wear in the valve system.

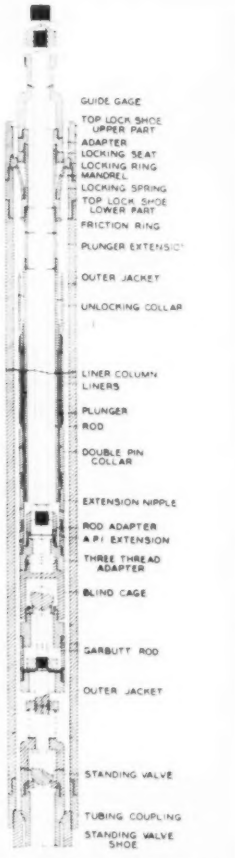

Fig. 1—Cross-section of mud.

The unique top lock on the pump makes it possible to maintain a top seal which protects the pump parts susceptible to abrasive action, particularly under the influence of fluid weight. The entire pump is in operation below the top seal which, in a sense, bypasses the weight of fluid and the abrasives are taken care of and kept away from the wearing surfaces in about the same manner as in a tubing liner pump using a macaroni pipe.

This type of pump on the upstroke seals the weight of the fluid at the traveling valve with the pressure being applied on the lower end of the plunger and any slippage takes place in the upward direction. On the downstroke of the pump the fluid weight is equalized inside and outside the working parts with the liner column dropping away from the abrasive materials in the plunger. The standing valve seat and ball are supporting the weight of fluid at this time. It is emphasized that wear is negligible since there is lubrication without pressure. The pressure from above is resisted by the tapered seal on the top lock and the top lock is considered to be a nonwearing part and it enables the pump to resist wear. It practically eliminates the possibility of sanding up.

A pump with this type of top seal is susceptible to gassing. Any gas coming through the standing valve will rise to the upper end of the outer jacket and will be trapped below the top seal. It will build up in a downward direction until the standing valve is locked, preventing further fluid entry. Under these conditions it has been found that a suitable gas anchor is an absolute necessity.

Typical field performance data are given in the following table:

Well number	1	2	3	4
Well depth, ft.	1,256	1,257	1,228	4,468
Pump tubed to	1,201	1,088	1,170	4,330
Gravity of oil, A.P.I.	12.3	15.8	12.2	14.2
Stroke, in.	32	24	24	42
S.p.m.	4	10	12	4
Gross fluid, bbl. per day	40	138	33	52
Estimated pump efficiency (based on A.P.I. charts)	53	97	63	64
B.s. and w.	52*	40	30	8

*Sand.

This type pump works very well in an "easy to operate" well and it is considered the pump efficiency will run very high in this type of well. It is anticipated that there will be an installation of one of these pumps in the Texas-Oklahoma area so that further field data may be collected and further definite conclusions can be drawn on its performance.

*Assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy, Rolla, Mo.

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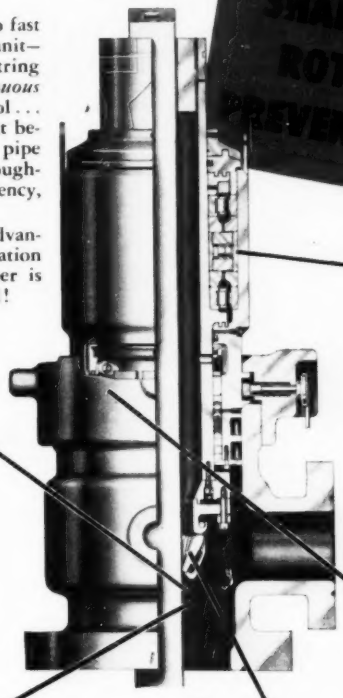
It will pay you to check these vital advantages . . . you'll see why the Shaffer Combination Rotating Blowout Preventer and Stripper is unequalled for all-around pressure control!



SEALS ANY SHAPE

The Stripper Rubber expands and contracts *automatically* to fit the various shapes and diameters in the drill string (excepting only such abnormally large diameters as the bit and reamer). It seals off around any shape—square, hexagonal and octagonal kellys . . . as well as couplings, tool joints, subs, drill collars and pipe, whether upset, flush or coupled. *No manual adjustment is necessary!*

SEALS CONTINUOUSLY

A pressure-tight seal is maintained at *all* times without need for applying mechanical or hydraulic pressure of any kind from the outside . . . and the seal is self-adjusting to the varying shapes and sizes in the drill string. The operator can *drill* under pressure, and can also *strip* pipe in and out of the well under pressure—*all without adjustments or changes in the unit!*

AMAZING COMPACTNESS

Space-saving compactness of the Shaffer Combination Rotating Blowout Preventer and Stripper reduces vertical height requirements and permits installation even under the most difficult space limitations. Even the flow connections are built directly into the body, thus simplifying hook-ups and eliminating need for spools or other equipment for overflow connections!

PRACTICALLY NO WEAR

Since the Stripper Assembly rotates freely *with* the kelly—not one inside the other—there is virtually no wear on the rubber. This reduces maintenance, assures a pressure-tight seal and maximum safety. In addition, the bearing assembly upon which the unit rotates has separate thrust and radial bearings to withstand the severe loads due to high pressures and high speed drilling. Bearings are lifetime prepacked with heat-resisting lubricant.

FAST RELEASE

Bits and reamers can be passed through the unit with maximum ease, safety and simplicity. Simply pull a spring latch, rotate the bonnet 1/6 turn and the entire internal mechanism as a unit can be withdrawn to permit removal of the bit or reamer. When going back into the hole, simply reverse the operation. It's as quick as that!

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Radio Relay System

(Continued from page 89)

west from Philadelphia, the first ridge has an elevation of approximately 300 ft.; the second, approximately 700 ft.; the third, approximately 800 ft.; and the fourth, approximately 1,000 ft. A further complication is fact that each pumping station lies in a valley behind one of these ridges, thus putting them in the shadow of a radio beam from Philadelphia. The elevations of the points to be linked are:

Atlantic Refining Building, 310 ft. above datum level; Boot pump station, 570 ft. above datum level; Montello pump station, 480 ft. above datum level.

Several peaks were selected in the vicinity of the Boot pump station which could provide a line-of-sight path to both Philadelphia and Boot. One of these was screened from the Atlantic Building by a series of buildings considerably taller than the Atlantic Building. Before dismissing this site, the possibility of locating the terminal radio-frequency equipment on one of these buildings was investigated. Two of the other peaks could not be procured because of the owners' reluctance to sell or lease portions of their property. The fourth peak, on a radio test, showed a poor propagation path, requiring the use of an additional repeater for reliability.

The ultimate choice was a peak near Valley Forge, approximately 8 miles from the Boot pump station. This peak is shown on the topographical maps as an elevation of 680 ft. (An independent survey proved the actual elevation to be 650 ft. . . the geodetic map being in error by 30 ft.). A profile of the terrain shows that this altitude of 650 ft. would necessitate a tower approximately 170 ft. high to provide Fresnel zone clearance over the intervening ridge at Bryn Mawr to the roof of the Atlantic Building. Actually, the necessary clearance was obtained by use of a 150-ft. tower (to minimize the expense of complying with CAA regulations) and by adding a 40-ft. structure to the top of the Atlantic Building. The profile toward Boot pump station showed that any height sufficient to clear local obstacles (trees, buildings, etc.) would provide the necessary Fresnel zone clearance. As the trees in the vicinity have a height of 75 ft., a 100-ft. tower at Boot was indicated.

The location of Montello (elevation 470 ft.) behind a ridge (elevation 1,000-1,200 ft.) eliminated the possibility of beaming directly from the Valley Forge repeater to the pumping station. A second repeater site had to be chosen. This site not only had to provide a line-of-sight path to the pumping station and to Valley Forge, but also had to be strategically located so that the relay could be extended to the west in the future.

Several points meeting these requirements were found after careful study of the topographical maps. One site fell in the middle of a municipal park, hence was not available; and a second could not be purchased or leased. Therefore, the third site, atop Deer Path Hill, overlooking the city of Reading, was chosen. This lies in the fourth ridge, mentioned above, at an elevation of 1,100 ft. A 100-ft. tower was necessary to clear trees, provide line-of-sight toward Valley Forge and establish a suitable height for future expansion to the west.

The Montello pump station lies in the Reading Valley, approximately 6 miles to the west of Reading at an elevation of 470 ft. The pump station is visible on a clear day from the Deer Path Hill tower. A 60-ft. tower at the pump station provides sufficient clearance above the local trees.

A section of the link from the Atlantic Building to the Valley Forge repeater and to the Deer Path Hill repeater form the backbone of the system (Fig. 1). The Boot and Montello pumping stations are side extensions. The Montello station is the present west terminal of the relay, with complete terminal facilities. As the system is extended Montello will become a way station, similar to the Boot station.

Equipment Installations

The advantages of operation in the frequency spectrum utilized in the system installed for Keystone become apparent when the matter of locating the radio equipment with respect to the antennas atop the towers was considered.

When RF equipment must be mounted in close proximity to the antennas on the towers, substantial costs are incurred in providing towers which will bear this added load. Furthermore, maintenance and inspection of such tower-top installations constitute a hazard and inconvenience to personnel, particularly in inclement weather.

These undesirable factors were eliminated in the Keystone project because the 2,000-megacycle region in which the equipment operates enabled the RF, multiplex, and relay or terminal equipment to be entirely housed in a single building at the base of each tower, without incurring excessive transmission-line losses. Having all components except the antennas in a single building also eliminates potential trouble spots which could result from the interconnection networks required when portions of the radio and terminal or relay equipment are located in separate structures.

Ais-spaced, 52-ohm, copper coaxial line, $\frac{7}{8}$-in. diameter, with an attenuation of 2 DB per hundred feet, was

used where transmission line distances exceeded 60 ft. For shorter distances, solid dielectric coaxial cable (RG-17/U) was used.

In all cases, the radiating and receiving dipoles are mounted at the foci of parabolic reflectors which concentrate the beam. The power gain over a simple dipole is proportional to the diameter of the parabola. Calculations made for received signal strength at Valley Forge and Deer Path Hill, after including the losses due to path attenuation and transmission-line losses, indicated that 10-ft. parabolic reflectors would give sufficient gain over these paths for satisfactory operation, even with fades as deep as 30 DB. The short side paths (8 miles to Boot and 6 miles to Montello) need only 6-ft. reflectors for the same service.

The dipoles are enclosed in plastic housings to minimize rain and snow effects and, together with the transmission lines, are pressurized with dry air. An automatic pump and dehydrator system maintains this pressure at a minimum of 5 lb. above atmospheric.

With respect to the antenna system, the installation described here utilizes a separate parabolic antenna for each RF transmitter and each RF receiver. When desired, an optional type installation permits this same transmission to be accomplished by using only one parabolic antenna for both the transmit and receive RF paths. This is accomplished by using an appropriate filter in the transmission line.

Philadelphia terminal.—The Philadelphia terminal has two 10-ft. antenna assemblies mounted side by side on a 40-ft. extension atop the Atlantic Building (Fig. 2). These parabolas provide a gain of 34 DB over a point source, and transmit a beam approximately 5° wide. At installation, the antennas were oriented with the aid of a regular surveyor's transit and geodetic maps.

It has been found that a final adjustment in elevation is most often not required since the usual difference in elevation between two sites is 1,000 ft. at most. In 30 miles, this differential produces a negligibly small angle. With the parabolas set at a true horizontal and a 5° transmitting beam spreading to about 2 miles at a distance of 30 miles, the receiving antenna will lie in the beam in the vertical direction in all but the most extreme cases.

Valley Forge repeater station.—The Valley Forge repeater uses a 150-ft. triangular steel tower and a concrete house for equipment at the base of the tower. This tower mounts four 10-ft. by two 6-ft. parabolas. Two of the 10-ft. assemblies are directed toward Philadelphia and the other two toward the Deer Path Hill repeater station. The two 6-ft. parabolas are directed toward the Boot pumping station . . . 8 miles away and approximately 60° south of the beam to Deer Path Hill.

The building at the base of the tower houses the radio repeater equipment and also an emergency power source. The latter equipment consists of an inverted rotary converter and a bank of storage cells, arranged for automatic cutover in case of power failure. A gasoline-engine generator can be started by maintenance personnel in the event of prolonged outage.

In routine operation, this station is entirely unattended.

The Deer Path Hill repeater station, also unattended, is almost a duplicate of the Valley Forge repeater. The principle difference is that it utilizes a 100-ft. rectangular tower, supporting, at present, two 10-ft. parabolas directed toward Valley Forge and two 6-ft. parabolas directed toward Montello (Figs. 3, 4). The tower has provisions for mounting six additional 10-ft. parabolas for future expansion of the system to the north, west, and south.

Boot pumping station side extension.—The Boot pumping station installation has a 96-ft. tower, mounting two 6-ft. parabolas oriented to the Valley Forge repeater station. The radio equipment is housed in a fireproof concrete house at the base of the tower. Audio extension lines in-

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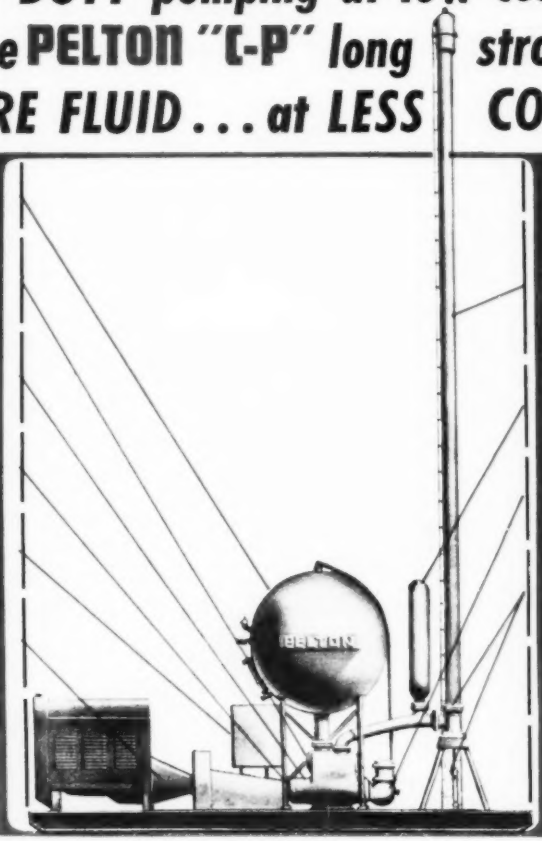

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Unit automatically shuts down in case of a rod part, stuck bottom hole pump, etc.

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The counterbalance pressure and the operating fluid is automatically maintained at the correct level.

THE PELTON LONG STROKE

Fewer rod reversals per minute are required to obtain the desired production, resulting in longer rod and pump life. The stroke loss due to rod and tubing stretch is reduced and the bottom hole pump efficiency is increased which in turn aids in handling gassy or sandy fluids as well as increasing the production rate.

THE PELTON HYDRAULIC DESIGN

Sucker rod life is further increased with soft controlled rod reversals, a constant polished rod velocity over the greater portion of the surface stroke, and the use of the stress control accumulator.

THE PELTON MECHANICAL DESIGN

Extra capacity is provided to lift all the fluid desired with high mechanical efficiencies. Rugged construction provides long life with a minimum of surface maintenance. Simplified controls make for easy operation. Interchangeable parts insure quick servicing.

THE PELTON SERVICE

Service engineers are available 24 hours per day wherever Pelton equipment is pumping.

THE COMPLETE PELTON LINE

Pelton Jacks are available with polished rod load ratings of 20,000 lbs., 26,500 lbs., 30,000 lbs., 31,500 lbs., 35,000 lbs. and 40,000 lbs. with surface stroke lengths of 18 ft., 20 ft., 23 ft., and 30 ft. Complete information will be furnished upon request.

PELTON *Long Stroke* **HYDRAULIC PUMPING JACK**

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terconnect this building with the pumping station proper and the storage depot at nearby Exton. Although the pumping station is continuously manned, the communication equipment operates on an unattended basis, with alarm indication extended into the pump house.

The circuit from Philadelphia to Boot is a drop and insert channel via the Valley Forge repeater. It serves as a party-line facility and is connected to the dispatch party line channel at Philadelphia.

Montello terminal station. — The Montello terminal of the relay system, situated on company grounds, utilizes a 60-ft. tower with two 6-ft. parabolas. At this point two channels are connected to the existing physical dispatching circuits for the west and north lines; a third channel is extended as a through message circuit to Pittsburgh over a Federal 9-A-1 carrier telephone channel; and the fourth circuit provides a Philadelphia-Montello message circuit (Fig. 5).

Pulse Time Multiplex principles.— Pulse Time Multiplex is a system for transmitting many channels of communication over a single medium. This can be a radio-frequency circuit or a coaxial cable, either of which must be capable of transmitting a rapid sequence of distinct, short pulses. Unlike frequency division systems, in which all channels are transmitted continuously and simultaneously, this is a time-division system in which information is sent for only one channel at a time. This factor removes a severe limitation from the radio-frequency equipment in that it need not have a linear characteristic.

Each channel is transmitted by sending a series of samples taken at a rapid rate. This sampling, or scanning rate, must be at least 2.3 times the highest frequency of channel content to be reproduced. Thus, for a 3,400-cycle upper limit, a scanning rate of 8 kc. is indicated. One single idle channel is thereby represented by a series of equally spaced pulses, 125 microseconds apart.

Modulation of the channel causes the pulses to deviate from their nonmodulated median positions in time—to appear earlier or later in accordance with the modulating signal. Maximum modulation thus displaces the channel pulses forward and backward in time to the greatest degree permitted by the system design. The rate at which pulses are displaced depends upon the frequencies in the channel signal.

Transmission.—In the P.T.M. equipment described, 22-channel capacity is achieved by dividing the 125-microsecond interval into 24 equal parts, each being 5.2 microseconds in duration. A pulse is transmitted during each of these 24 segments. The first segment contains the unvarying marker pulse. This is made distinctive by using two pulses spaced 1.3 microseconds apart. The marker pulse gives a time reference by means of which the demodulating equipment can separate and demodulate the channels. The single pulses of the 23 channels occupy the remainder of the segments.

The introduction of crosstalk into each following channel is avoided by making the pulses so short that they die away with no significant remainder left to affect the next pulse. The pulses used in this system are 0.5 microseconds long. Since demodulation depends upon the leading edge of the pulses, they are shaped to rise to their maximum in 0.15 microseconds—thus minimizing noise.

Modulation.—It is simpler to generate modulated pulses considerably broader than 0.5 microseconds in the modulating process and shorten them later. Accordingly, the channel modulators are placed in three groups. The first group contains the eight modulators for channels 1, 4, 7, through 22; the second group contains eight modulators for channels 2, 5, 8 through 23; while the third

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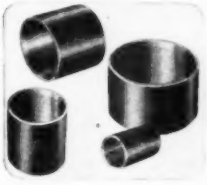

Seamless Steel Pipe Couplings • Threaded on special machines, assuring accuracy of form, height, angle, and lead. Threads electro-galvanized—will not gall under severest strain. Made to A.P.I. specifications.

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group contains seven modulators for channels 3, 6, 9, through 21. The time represented by the missing channels in each group allows for the broad pulses without causing crosstalk.

The pulses for each group are combined by a mixer-shaper circuit which shortens the pulses to make room for those of the other two groups. The pulses from all three groups are mixed and further shaped in the mixer-line amplifier. This circuit also generates and adds the marker pulse.

The pulses generated by each channel modulator are made to occur in the proper sequence for interleaving by sending short pulses at the 8Kc rate into a delay line commutator. This commutator has 23 taps, spaced 5.2 microseconds apart, with each tap connected to a different modulator so that they operate in sequence—one after the other.

The mixer-line amplifier has an output impedance of 70 ohms, with sufficient power to modulate the radio transmitter over as much as 2,000 ft. of solid dielectric video cable (RG-11/U).

Reception-demodulation. — The received P.T.M. signals are applied to the demodulating equipment as video pulses. They are first passed through amplitude limiters and differentiated to remove amplitude noise. The marker pulse is identified by its double pulse characteristic and used to generate an 8-kc. pulse. This pulse, approximately equal in length to the period allotted to an individual channel, is used to change each channel demodulator, in sequence, from a normal blocked condition to a receptive condition. This is accomplished by sending the deblocking pulses into a delay line commutator similar to that used in transmitting.

Transmitter equipment.—The P.T.M. transmitter consists of a three-stage video amplifier, modulator, and microwave oscillator. The video signal from the multiplex modulator is applied across the input of the transmitter and amplified and shaped in the video amplifier. The oscillator, using a planar electrode triode (type 2C43) operating in a cavity of the reentrant grid bell type, provides extreme circuit simplicity with a maximum degree of stability.

The output of the transmitter, a series of RF pulses, is applied through a transmission line to the antenna.

Receiving equipment.—In the P.T.M. receiver, which is of conventional superheterodyne design, the local oscillator utilizes a type 2C43 planar electrode triode operating in a cavity similar to that used in the transmitter. A coaxial cavity crystal mixer, a 30-megacycle intermediate frequency amplifier and a video output stage comprise the remainder of the receiver.

Two-Wire Operation

The voice channel sides of a P.T.M. channel modulator and a channel demodulator are connected to give ordinary two-wire telephone circuits by a four-wire terminating set, including hybrid coils. This arrangement is similar to that used in carrier telephone and four-wire voice circuits to join a two-way circuit with two one-way channels.

Signaling or dialing associated with the telephone circuit is separated and recombined by suitable ringers or dialing repeaters, using the equivalent d.c. signal of P.T.M. to pass the signals over the system.

D.C. Signaling

The equivalent of d.c. signals are transmitted over P.T.M. channels by displacing the channel pulse to a forward position. This forward displacement is repeated on each pulse throughout the duration of the signal. In the demodulating equipment this pulse is detected and applied to a relay.

In the Keystone installation, this equivalent d.c. signaling is used to transmit dialing, ringing, and railway selector impulses. It is also available for telemetering and supervisory indications.

Railway Dispatching Selector Operation

An important requirement of the Keystone microwave system was that it must function as an intermediate link in a wire system utilizing Western Electric Co. railway selectors, with impulse sending equipment at a number of locations on either side of the radio section.

This function required reception of $3\frac{1}{2}$ to 5-cycle polarized impulses at d.c. voltages up to 300 volts or more—sending them over the P.T.M. as on-and-off signals and then reproducing similar high-voltage polarized impulses for application to the physical line at the other end of the radio system. This operation is required in either direction as signals are received.

To meet these requirements, polarized relays are provided to pick up the pulses from the line and various time delay circuits are incorporated to insure performance in one direction at a time without undesired kickbacks in the reverse direction.

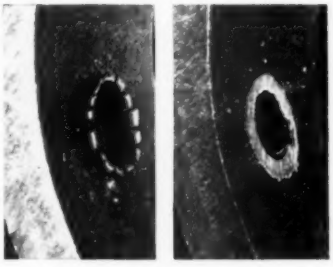
The d.c. signal is used to control standard railway selector apparatus cases and line rectifiers for transmitting the signal to the outgoing physical line. At points where no physical line extension is required, such as the north line dispatcher at Philadelphia, the dispatcher's selector key is connected on a simple d.c. basis to the P.T.M. modulator signal-sending circuit. A simple capacitor charge and discharge circuit is used to operate the railway selector set directly from the received d.c. signals.

SECURITY CASING SCRAPER MAY BE RUN THREE WAYS

Casing is scraped clean when the Security Casing Scraper is run on either (1) wire line, (2) tubing, or (3) drill pipe. This is possible because it is the only scraper whose cutter teeth contact 360° of the casing circumference at all times. Multiple teeth positively clean every inch of casing with rotary or vertical movement. For example, on the 7" Security Casing Scraper, there are 24 individual shearing teeth which form a total of 98 linear inches of cutting surface. The teeth act upon an obstruction approximately 800 times under average operating conditions.

Reversible Cutter

Tool design and construction is simple and maintenance is easy. Each cutter is held against the casing by three strong coil springs, which exert an even pressure between cutter and mandrel.
The helical teeth on the four opposed, spring loaded cutters produce shearing action which cleans casing quickly, cutting away all burrs or foreign material. Reversible cutters give extra service life.



Perforation Burrs Removed Cleanly

Unretouched photograph of gun perforation before and after removing burrs with Security Casing Scraper. Photo on right shows burr is actually cut (sheared) away, not crushed or broken. For economical scraping, specify Security.

SECURITY ENGINEERING CO., INC.

ONE OF THE DRESSER INDUSTRIES

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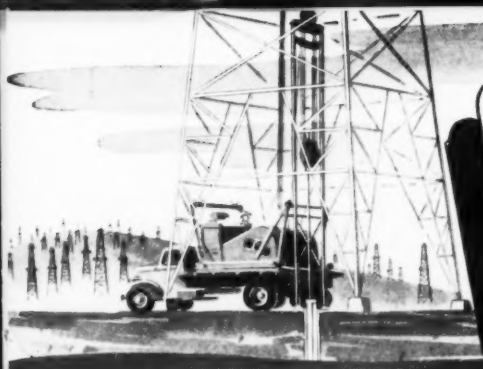
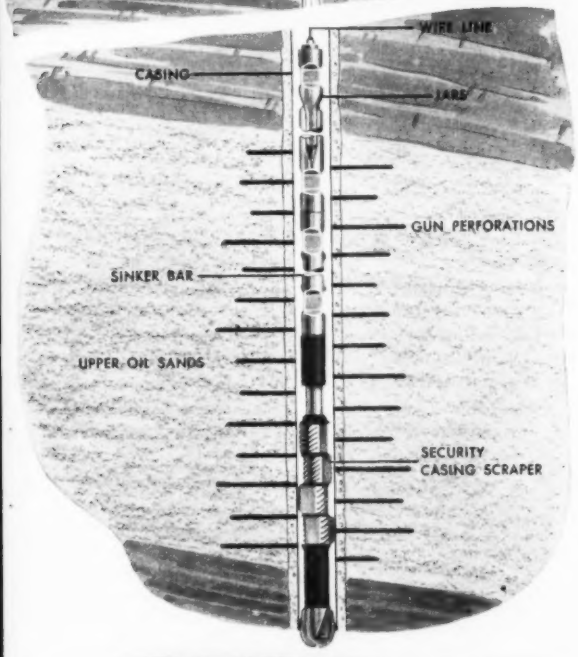


LOCATION: Signal Hill

WELL HISTORY: Depleted production required recompletion at upper pay zone. Gun perforated at 10,000 feet opposite new pay.

PROBLEM: Economically scrape casing perforations without rotary equipment.

How would you Scrape Casing Without a Rotary?



The production superintendent of a large oil company was faced with the problem of scraping 7" casing which had been gun perforated with 150 holes at a depth of 10,000 feet. The only work-over equipment on the job was a small pulling unit backed up to the standard derrick.

The only way he could solve the problem, without moving in rotary equipment, was to run a Security Casing Scraper on wire line. He ran a 7" Security Scraper on ⅝" wire line with a sinker bar above the Scraper and a set of jars above the sinker bar. The scraper was run up and down through the gun perforated section. Only three hours were consumed in this operation, including running in and out of the hole. Packers were run through the scraped section and set without difficulty.

This is a typical example of how the Security Casing Scraper can reduce your work-over costs because it is the only Scraper which does a complete job when run on drill pipe, tubing or wire line. Call your Security Field Representative when you are ready for your next scraping job.

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JOHN ZINK ALL-METAL

JZ AIR HEATER

MAY BE MOUNTED
HORIZONTALLY, VERTICALLY
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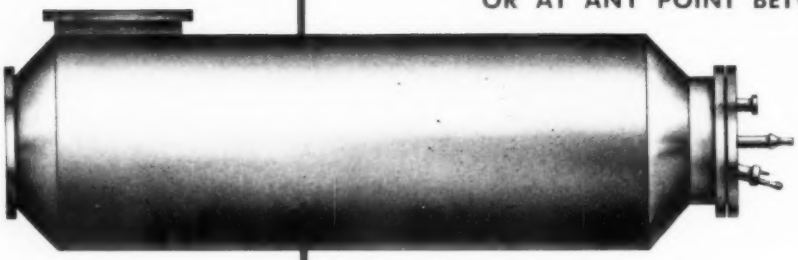


FEATURES

Its light weight makes expensive cranes and field rigging unnecessary

Exceeds performance specifications

Complete packaged units

No labor for installing refractory lining since no refractory required

Can be furnished for either horizontal or vertical installation

Will not burn out

Costs less to buy

Costs less to install

Costs less to operate

Low first cost, low installation cost, light weight and perfect stability through a turndown range of from 125% normal duty to 5% of normal duty are features of the JZ All-Metal Air Heater for process work.

The first cost is low because no expensive refractory lining is required. The installation cost is low because the labor for installing the refractory lining is eliminated; but, more important, the problem of rigging to put the vessel in place is simplified because the weight of the vessel complete is only 4,000 lbs. (app.).

The vessel is very compact to make it easier to fit it into congested process areas.

The special JZ Air Heater Burner combines combustion knowledge gained in years of experience in burning gas. It is a fine study in the endothermic functions involved in maintaining stable burning of extremely high excess air as well as producing extremely rapid and complete mixture of air and gas.

JOHN ZINK COMPANY

4401 South Peoria — Tulsa, Oklahoma

Semimicrofractionation

. . . by means of spinner columns

by A. V. Cruthirds,* W. C. Jones,* and W. D. Seyfried*

FREQUENTLY in research work, the complete interpretation of small-scale experiments is hampered considerably by difficulties encountered in fractionating adequately the small volumes of samples available. Need for a fractionator capable of handling small volumes of materials has led to the development and evaluation of a semimicrofractionation column consisting essentially of a vertical glass tube containing a suspended chromel band which may be rotated at high speed.

A number of distillation units which achieve improved fractionation by means of a rotating member within the unit have been described in the literature.[1,2,3,4,5] In general, these units have not been completely satisfactory for laboratory use because of a number of factors.

The column described here incorporates a number of features, designed primarily to reduce holdup and to increase the efficiency and ruggedness of the column. In its present form, the column has been found extremely useful not only in fractionating research samples, but also in controlling plant operations. Its usefulness in plant control lies largely in the fact that it is capable of fractionating a sample much more rapidly than is usually the case in conventional packed columns.

The 24-in., 0.26 mm. i.d. spinning band column used in this laboratory has 11 theoretical plates at total reflux (H.E.T.P. of 2.2 in.), a maximum boil-up rate of 680 ml. per hour, a holdup of 2.0 ml. under operating conditions and 0.2 ml. under static conditions, a pressure drop of only 10.5 mm. of water, and can fractionate samples ranging from 10 to 200 ml. With suitable precautions 10 ml. samples may be distilled but best results are obtained on samples of 25 ml. or higher when distillation to low bottoms is required.

To obtain an H.E.T.P. of 2.2 in., the chromel strip must be rotated at speeds of at least 1,800 r.p.m. Increasing spinner speed to 6,000 r.p.m. has very little effect on fractionating efficiency. A 4-ft. spinning band column, also used in this laboratory, has the same characteristics as the 2-ft. column, except, of course, that the number of theoretical plates is doubled.

Recently, the spinning band column has been adapted to vacuum operations by substituting a magnetic drive assembly for the air motor used in the atmospheric units. The use of the magnetic drive makes possible a vacuum-type unit that has been operated successfully at pressures as low as 0.1 mm. Evaluation of the vacuum spinner at 0.1-mm. pressure and 3,000-r.p.m. spinner speed with a binary mixture of di-2-ethylhexyl phthalate and di-2-ethylhexyl sebacate demonstrated an H.E.T.P. of 4 in. for this column.

Because of the rapid approach to equilibrium of the spinning band columns, these columns have been found useful in plant control operations where a high degree of fractionation is not required.

The 2-ft. spinner atmospheric distillation unit is shown in Fig. 1. The 4-ft. unit has the same design specifications except that the fractionating section is 4 ft. in length. Also, in order to reduce vibrations, the spinner ribbon in the 4-ft. unit has been divided into four sections held together with small stainless-steel links.

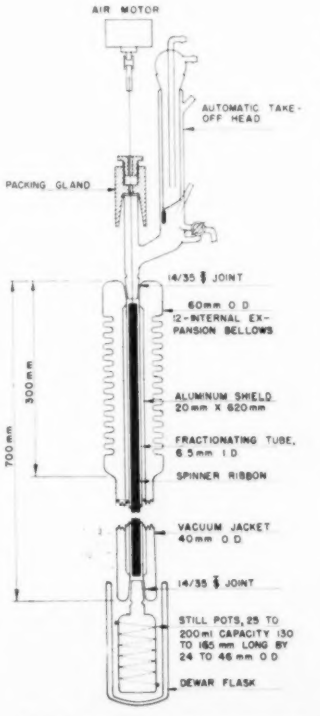


Fig. 1—Atmospheric spinner assembly.

Construction

The column is Pyrex with an aluminum shield fitting loosely around the fractionation tube. The fractionation tube is very nearly 6.5 mm. inside diameter and should be carefully selected to insure that it is straight and of uniform bore. The aluminum shield (Type SH aluminum foil, bright finish, 0.005-in. thickness) is formed by rolling the aluminum sheet on a mandrel, overlapping and crimping the edges, and securing the crimped edge by making indentations with a small punch. Peep holes may be cut as desired with a cork borer. To prevent thermal breakage of the glass column an expansion bellows is incorporated in the vacuum jacket. The bellows should be constructed with at least 12 corrugations which may be formed in a section of tubing. For satisfactory performance, the vacuum jacket must be carefully evacuated.

A number of cylindrical stills wound with chromel wire accommodate various size samples. The most frequently used still, 100 ml., is wound with about 12 ft. of No. 28 chromel wire. At 110 volts, this heating element uses about 100 watts. The cylindrical shape of the still permits the placing of a quart size Dewar flask around it during operation to prevent heat loss and disturbance from drafts.

The column head is the solenoid-operated, automatic intermittent takeoff type. The takeoff device is actuated by an electromagnetic coil and the rate is set and controlled by a timer. The head is designed to

*Humble Oil & Refining Co., Baytown, Tex.

minimize holdup in the takeoff line. Top vapor temperatures are read by means of an iron-constantan thermocouple placed at a point near the product takeoff line, and connected to an indicating potentiometer. Since the proper functioning of thermometric systems is essential to good distillations, frequent periodic checks were made at two suitable boiling points by distilling separately samples of pure n-heptane and napthalene.

The spinner ribbon is constructed of chromel A ribbon, ¼ in. wide by 0.0126 in. thick, 25.2 in. long. Width of the spinner and the inside diameter of the fractionation tube may deviate slightly from the dimensions specified but it is essential that annular clearance be a minimum, in the order of 0.07 mm. Ribbons in daily use for periods of 6 months and longer have shown no wear except very near the ends.

The top end of the spinner ribbon is welded to a ⅛-in. diameter KA2S welding rod 8 in. in length. When the unit is assembled this rod passes through the packing nut and serves as the drive shaft connecting the spinner ribbon to the motor.

The brass packing nut drive shaft hole is precision center bored to ⅛-in. diameter. If this drive-shaft bearing is bored with a ⅛-in. drill and the specified ⅛-in. rod is used for the drive shaft, a correct fit will be obtained. The fit should be close to minimize leakage; however, if binding occurs, the rod may be dressed down with fine emery cloth. The packing nut is fixed on the column head with porcelain cement, the same type as used for fixing the still-pot electrical windings.

The upper end of the spinner drive shaft extending from the packing gland is coupled to the motor by means of a short section of ¼-in. brass welding rod drilled and provided with a set screw to hold the drive rod at one end and a piece of rubber tubing at the other end for coupling to the motor.

The air motor is a heavy-duty unit since the conventional laboratory air motor is not powerful enough. An explosionproof high-speed electric motor of about ⅛ hp. may be substituted if desired. To aid in maintaining the necessary high speeds, frequent checks are made using a vibrating reed type of tachometer. To reduce the effect of air-pressure fluctuations a regulator valve should be installed in the air line.

A modified spinner unit suitable for distillations at reduced pressure is shown in Fig. 2. Design features of the fractionation section are in general the same as for the atmospheric type. The primary difference is a larger fractionation tube with wider spinner ribbon. A major difference in design of the unit is the condenser incorporating a magnetic drive assembly. In the construction of the magnetic drive the rotating parts must be carefully balanced and centered. The top of the condenser head must be flat so that the magnet can be fixed as near the keeper bar as possible. The spinner drive shaft passes through a threaded hole in the exact center of the keeper bar and is rounded and polished on the end to form a bearing in the center of a cup-shaped piece of stainless steel which is cemented in the depression in the top of the condenser head.

A rigidly supported ball-bearing assembly is used on the drive shaft from the motor to the magnet holder to reduce vibrations. The thermometric system and controls for the automatic takeoff device and the construction of spinner drive shaft and the specification for the clearance between spinner ribbon and inside of fractionation tube are the same as for the atmospheric spinner unit.

Operation

The sample to be distilled is measured into the still which is then fastened to the column by spring clamps. The heater wires are connected and a Dewar flask is placed around the still with its top slightly above the bottom of the fractionation column. Glass wool is placed in the annular space near the top of the Dewar flask.

Ice water or other coolant is circulated through the condenser. Heat is adjusted to give a boilup rate which will cause condensation for about 1 in. on the condenser. The air motor is then started and its speed increased rapidly to 2,000 r.p.m. minimum. The condensate serves as a lubricant for the spinner and consequently the spinner should not be operated until the column is refluxing. This is especially true if the magnetic drive head is being used because the reflux is necessary for lubrication of the bearings at the top of the spinner drive shaft. In starting up the spinner when using this type of head, it desirable to have a needle valve on the air line to the air motor so that the spinner may be brought up to the required speed gradually.

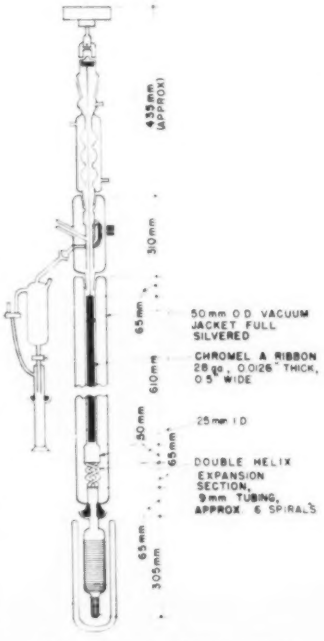


Fig. 2—Vacuum spinner assembly.

The column should operate under total reflux for at least 30 minutes. After this period the rate of takeoff is adjusted as desired, depending on the degree of fractionation required. Reflux ratios varying from 5 to 1 to 20 to 1 are common for routine distillations. Boilup rate is not critical for the 2-ft. column but should be maintained as low as practicable with the 4-ft. column. For distillations to low bottoms (10 per cent or less on a 50-ml. charge), a chaser liquid should be used. When the distillation has been completed the air motor is stopped, heater leads are disconnected, the Dewar flask is removed, and about 15 minutes' drainage time allowed before measuring bottoms.

The vacuum distillation unit may be used for atmospheric distillations. It is suggested, however, that in case interest is confined to distillations of samples in the gasoline boiling range, the atmospheric type of unit be used as it is less expensive and easier to construct and install.

Procedure for bringing the temperature and pressure of the apparatus up to distillation conditions is exactly the same as for conventional design packed-column operation. The pressure is lowered to the desired condition and then the heat is gradually increased until distillation at the desired rate is obtained. The usual precautions are taken to minimize bumping in case the sample contains water.

Performance

For plate determinations, a binary of 60 per cent toluene—40 per cent methylcyclohexane was used. The methylcyclohexane was purified by treating with three successive 5 weight per cent portions of sulfuric acid (C.P., 97 per cent strength) then washed with dilute sodium carbonate solution, water washed, dried over calcium chloride, and redistilled, saving only the heart cut distillate having a boiling point of 100.0° C. and an index of refraction n_D^{20} of 1.42318.

The toluene used was a plant sample of nitration grade which was rerun to obtain a center fraction having a boiling point of 110.6° C. and an index of refraction n_D^{20} of 1.49643. Plate determinations were made according to the graphic method of Mc-

Fig. 3—(Right) Effect of spinner speed and boil-up rate on efficiency of 2-ft. spinner column.

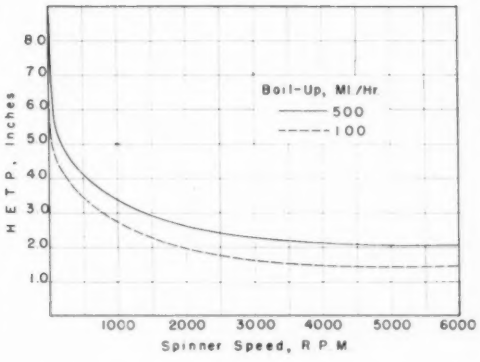
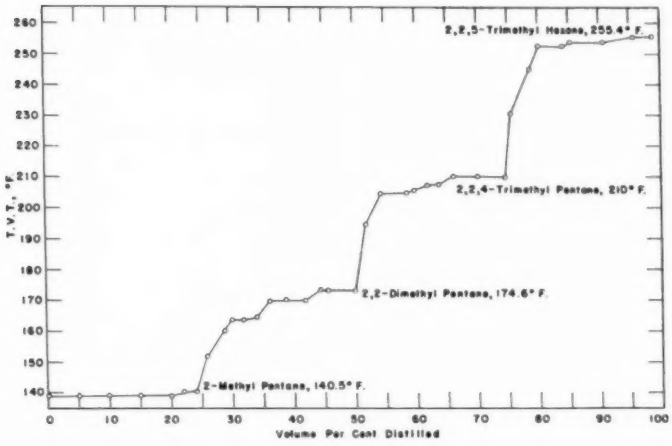


Fig. 4—(Below) Showing 2-ft. atmospheric fractionation of a four-component blend.



Cabe-Thiele[4] and using the equilibrium data of Quggle and Fenske.[8]

Fluctuations in spinner speed over the range from 1,800 to 6,000 r.p.m. have little effect on performance. Efficiency drops off very rapidly, however, below 1,800 r.p.m. Small variations in boilup rate apparently are not significant for the 2-ft. column but may have marked effect on the efficiency of the 4-ft. column. The data which are plotted in Fig. 3 were obtained from a typical spinner column and indicate the effects of changing spinner speed or boilup rate. The maximum boilup rate, or flood point, was found to be 680 ml. per hour for the 2-ft. atmospheric column according to the Shell method, when using a mixture of 30 per cent n-heptane, 70 per cent methylcyclohexane. Pressure drop through the column at this boilup rate was 10.5 mm. of water. Operating holdup was 2.0 ml. and static holdup, about 0.2 ml. Corresponding values for the 4-ft. column are 765 ml. per hour maximum boilup, 15.0 mm. of water pressure drop, 9.4 ml. operating holdup, and 0.3 ml. static holdup.

A further check on the efficiency of the 2-ft. atmospheric spinner column was obtained by distilling a mixture of equal parts of four commercially available paraffins, each approximately 95 per cent pure. The distillation curve is shown in Fig. 4.

Good reproducibility may be expected of distillations made by spinner units. On 12 routine distillations, by several different operators, of a sample of refinery naphtha, wherein six distillations were performed on the 2-ft. atmospheric spinner unit and six distillations on the 6-ft. Fenske packed column, the average error of reading a cut point is 1.3° F. by spinner distillation versus 1.9° F. by packed-column distillation.

A comparison of the operating characteristics of atmospheric spinner and conventional packed columns is summarized in Table 1. This information emphasizes the advantage of spinner units over conventional packed units, especially for the rapid distillation to low bottoms of small samples. These features are realized in the spinner unit with little sacrifice of plate efficiency and at comparable takeoff rates.

The spinner unit for vacuum distillations has operated satisfactorily when fractionating samples of gas oil. Sample charges of only 100-200 ml. may be distilled to 5 per cent or lower bottoms due to the low operating holdup, 8 ml. or less. The time required for a complete distillation of gas oil is less than 2 hours, because of the rapid approach to equilibrium at total reflux. The vacuum spinner has been operated at pressures as low as 0.1 mm. and lower pressures are possible.

The vacuum unit was found to have 11 theoretical plates at total reflux when operated at atmospheric pressure on a mixture of toluene and methylcyclohexane. A plate determination was also made at reduced pressure, 0.1 mm., using the vapor-equilibria date of Perry and Fuguitt[7] for the binary, di-2-ethylhexyl phthalate and di-2-ethylhexyl sebacate. With this binary at total reflux and 3,000 r.p.m. spinner speed the unit was found to have six theoretical plates.

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TABLE 1—COMPARATIVE PERFORMANCE DATA ON ATMOSPHERIC SPINNER* AND PACKED COLUMNS*

	Column dimensions, in.		Capacity still, ml.	Theo. plates†	H.E.T.P. in.	Maximum boilup, ml. per hr.	Takeoff avg., ml. per hr.	Holdup, ml.		Pressure drop, mm. water
	Length	Diam.						Operating	Static	
Spinner	24	0.26	10 to 200	10.9	2.2	680	35	2.0	0.2	10.5
Spinner	48	0.26	10 to 200	18.8	2.7	765	20	9.4	0.3	15.0
Packed	72	0.75	500	36.0	2.0	‡750	50	‡50	20.0	§12

*Equipped with automatic takeoff heads. †At total reflux. ‡Estimated. §Mm. per plate.

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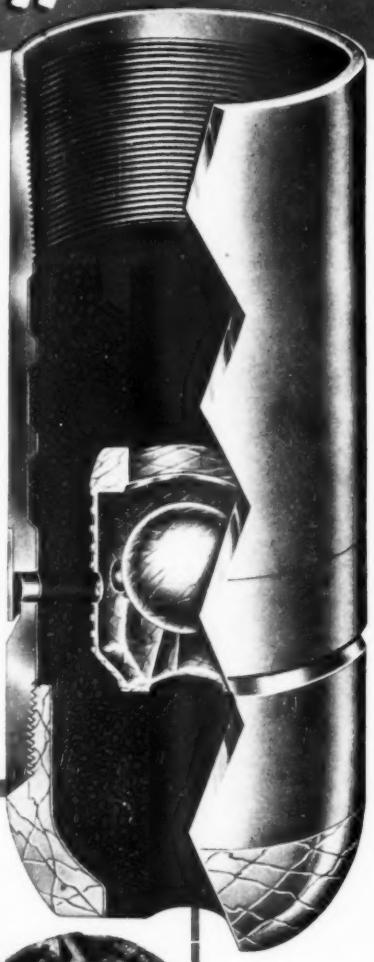

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PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

Thin Babbitt Bearings

TO the uninitiated it may be confusing to learn that in at least some services, the thinner the babbitt layer the longer the bearing life. Chief Metallurgist T. E. Eagan, of Cooper-Bessemer Corp., comments as follows and refers to Fig. 1 (courtesy Cleveland Graphite Bronze Co.):

It is now a well-recognized fact that the thinner the babbitt layer the better its load-carrying capacity and life. This is well illustrated in Fig. 1. It will be noted that we get no increase in life of the bearing from apparently very heavy thicknesses down through 0.032 in. and on to approximately 0.015 in. When the babbitt thickness is made thinner than this, bearing life begins to increase so that when 0.008-in. thickness is reached the life has been doubled, and with 0.004-in. thickness it is again doubled over the 0.008-in. thickness, etc., so that with 0.002 in. of babbitt the life of the bearing is four times the life with 0.008 in. The interpretation of this curve is important. The tests represented are those run with a load which is high enough that bearing failure is bound to occur sometime; therefore the criterion used is thickness vs. bearing life. Translating this back to practical significance, it means that the load-carrying ability of the bearing is higher up to a certain figure beyond which babbitted bearings would be of no use. On the other hand with any given load the thinner the babbitt, the greater the life.

The curve shown in Fig. 1 was determined by actual bearing tests carried out in a laboratory under controlled conditions with small bearings. We have proved its worth by actual tests on large bearings under actual conditions.

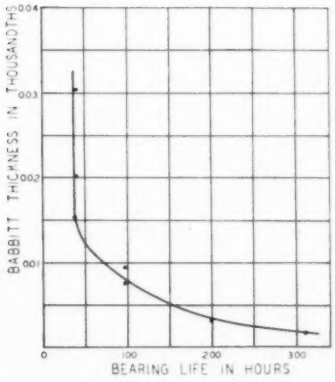

Fig. 1—Bearing life vs. babbitt thickness (mean unit bond—2,000 psi.).

High-Temperature Stability

THE stability of more than 100 different types of steel at 900°, 1,050° and 1,200° F. is being evaluated over a period of 10 years. Welded samples are included in this investigation. The results obtained in an examination of 16 typical low-alloy steels, after 10,000 hours' exposure in air, were presented by A. B. Wilder and J. O. Light, of National Tube Co., in their paper "Stability of A.I.S.I. Alloy Steels at Elevated Temperatures."

The steels were either normalized or annealed after exposure and generally two ranges of carbon content were investigated. The major conclusions were:

1. The steels were appreciably oxidized and decarburized by exposure to air at 1,200° F. for 10,000 hours. The amounts of oxidation after 10,000 hours were in the following ranges:

	Wt. loss (per cent)
900° F. temperature	0.9- 1.1
1,050° F. temperature	1.5- 1.9
1,200° F. temperature	9.4-42.4
S.A.E. 3316	9.4
S.A.E. 4815	12.7
S.A.E. 8624	29.5
S.A.E. 4640	42.4

2. The nickel and nickel-molybdenum steels graphitized at 1,050° F. Graphite was also observed in A.I.S.I. 2320 and 4640 steels after exposure at 900° F.

3. The steels containing chromium did not graphitize at either 900° or 1,050° F. even though an appreciable amount of aluminum was used in the deoxidation practice and, in certain instances, relatively large amounts of carbon were present.

4. The microstructures of the steels containing chromium were more stable than those without chromium. The chromium-vanadium and chromium-molybdenum steels were the most stable.

5. Hardness of the steels was, in general, slightly decreased after exposure.

6. Charpy impact values from ambient temperature tests were not adversely affected. Table 1 indicates the magnitude of the impact values.

TABLE 1—ROOM-TEMPERATURE IMPACT PROPERTIES BEFORE AND AFTER EXPOSURE

		Charpy full size keyhole notch (ft.-lb.)		
			Exposed 10,000 hours	
A.I.S.I. designation	Type	Before exposure	900° F.	1,050° F.
2320	Ni	45	38	53
2517	Ni	50	58	61
4615	Ni-Mo	55	52	42
4640	Ni-Mo	18	19	25
4815	Ni-Mo	44	49	33
4317	Ni-Cr-Mo	54	53	34
4337	Ni-Cr-Mo	28	23	27
8624	Ni-Cr-Mo	47	47	36
8630	Ni-Cr-Mo	32	31	30
3115	Ni-Cr	55	54	64
3130	Ni-Cr	33	25	36
4115	Cr-Mo	45	51	40
4140	Cr-Mo	23	20	23
6120	Cr-V	53	29	40
6145	Cr-V	13	11	15

Treatise On Wear

THE booklet entitled, "Wear, as Applied Particularly to Cylinder and Piston Rings," Kokosing Press, Mount Vernon, Ohio ($3.50) is an excellent treatise on the study of wear of cylinders and pistons. Theory and Research (Chapter 1) by F. P. Bundy, of General Electric Co., discusses the theory of friction and wear, constant pressure wear tests, and variable pressure wear tests with a new testing equipment. Metallurgical Considerations (Chapter 2), by T. E. Eagan, pertains to theoretical considerations and the results of wear testing done by Cooper-Bessemer Corp. The Design Aspects of Cylinder and Ring Wear (Chapter 3) is the work of Ralph L. Boyer. Boyer and Eagan are respectively the chief engineer and the chief metallurgist of Cooper-Bessemer, and the book is considerably a review of the research of Cooper-Bessemer on engine wear.

The booklet is too large and detailed (129 pages, 71 figures, 11 tables) for review here but three points might be mentioned:

1. About half of the wear that occurs near the top of the cylinder is due to the greater pressure exerted there by the ring, and about half to other factors such as temperature, inadequate lubrication, etc.

2. Piston rings and cylinders of about the same hardness are employed (over 190 Brinell). Hardened liners wear less but are not worth the cost. Considerable wear or scuffing occurs during breakin, but a glazed surface soon forms (on cast iron) and thereafter rates of wear constantly decrease.

3. Not many years ago wear rates of 0.001 in. per 1,000 hours were usual, whereas rates of 0.0003 in. are now common and rates of only 0.0001 in. per 1,000 hours are not unusual.

Gas-Compressor Stations

(Continued from page 94)

be southern pine; Douglas fir; white, burr, or post oak; eastern white and red cedar; chestnut; western cedar; spruce; redwood, or cypress. For permanent construction, timber piles must be driven below the expected or existing ground water level at the station site. Rapid decay of timber piles which are alternately exposed to wetting and drying usually occurs. If it is not possible to sink timber piles deep enough to prevent contact with water, a concrete pile must be spliced to the timber unit at the ground-water level. Where severe ground-water conditions are encountered, concrete or steel piles may have to be substituted for timber.

Concrete bearing piles are of two types: (1) those molded in place either with or without use of a casing, and (2) those which are precast, cured, and driven. Molded-in-place piles are usually circular and may or may not be reinforced. Many of the molded-in-place piles used in gas compressor station work are patented (Raymond, Simplex, and pedestal types). Precast piles may be circular, square, or octagonal (Fig. 6). All are reinforced. In the octagonal pile, a semicircular corrugation on each face increases the surface available for frictional resistance. Some precast concrete piles are also patented.

Steel piles may be of standard H shapes or those developed by individual manufacturers. Corrosive soils often quickly deteriorate steel piles and for this reason their use is somewhat limited in gas-compressor-station construction in certain areas. Where applicable, however, steel piles provide excellent support.

Regardless of what type of piles are used, they should be rigidly connected to the mat or well footings with steel reinforcing bars. It is general practice to slope the outside row of piles towards the mat center. The possibility of movement is thereby reduced. Safe loads for wooden piles are generally assumed to be up to about 10 tons per pile, for concrete piles, up to about 30 tons per pile. Pile spacing usually averages 2 to 3 ft. between centers.

Station Buildings

The modern gas-compressor station is usually composed of two buildings: (1) compressor station, and (2) auxiliary building. Steel framework, transite roof and siding, brick walls, and concrete foundations are generally considered to be standard construction material for both buildings. Steel-sash ventilating-type windows are usually used for the buildings. Since there is no real need for a basement in the auxiliary building, it is generally omitted to reduce construction costs. A basement in the main station building is always worth while because in it many small repair jobs can be performed without a great deal of legwork. In addition, it is a handy place for storage of lubricating oil, cleaning equipment and fluids, and other materials needed for everyday operation.

Compressor-building size is determined by the number of units installed, type of units, and the amount of space left for future expansion. Of course, the number of units installed has the greatest influence on station size but the type of gas compressors used also influences building size. For instance, building volume will just about double when slow-speed compressors are used instead of medium-speed units. Usual medium-speed compressors require about 13 cu. ft. of building volume per b.hp. and 0.75 sq. ft. of floor area in sizes between 750 and 1,500 b.hp. Slow-speed units of about equal capacity require up to 25 cu. ft. per b.hp. and 1.75 sq. ft. of floor area. Thus, the advantages of medium-speed engines and compressors are readily apparent. Centrifugal compressors, which are gradually finding uses in gas transmission, generally require less volume and area than most reciprocating compressors. However, since centrifugal compressors are better adapted for large-horsepower (above 500 hp. per unit) installations, it is reasonable to assume that reciprocating compressors will continue to be used for many years to come.

When foundation-material requirements are compared, it is found that the centrifugal machine requires the least, the medium-speed compressor next to least, and the slow-speed compressor the greatest amount of material. Centrifugal compressors, being inherently balanced, need only a light concrete base to support compressor weight. In medium and low-speed reciprocating compressors, the unbalanced forces must be resisted by the foundation and as a result the mass required is greater. Slow-speed reciprocating compressors require approximately 33 per cent more material in the foundation than medium-speed units.

TABLE 2

Recommended Water - Cement Ratios for Concrete to Meet Different Degrees of Exposure

Exposure—Water-cement ratio, U. S. gal. per sack for various classes of structures.	(*)	(†)
Extreme:		
(1) In severe climates, as in northern United States. (2) Exposure to sea and strong sulfate waters	5½	6
Severe:		
(1) In severe climates as in northern United states, with exposure to rain and snow but not continuously in contact with water. (2) Moderate climates, as southern United States, alternate wetting and drying	6	6¾
Moderate:		
(1) Climates like southern United States, exposure to ordinary weather but not continuously in contact with water. (2) Concrete completely submerged but protected from freezing	6¾	7½
Protected:		
(1) Ordinary enclosed structural members, concrete below the ground and not subject to action of corrosive ground waters or freezing and thawing	7½	8¼

*Reinforced piles, thin walls, light structural members, exterior columns and beams.
†Heavy walls, piers, and foundations.

Concrete Mixtures

Ordinarily, a 1:2½:5 mixture is suitable for compressor foundations. Where severe operating conditions are anticipated, a 1:2:4 mix (or richer) is preferable. Since the strength of a concrete mixture is dependent primarily upon the water-cement ratio, great care must be exercised in specifying the ratio to be used in the mat, block, and wall construction. Table 2 summarizes ratios which have been found suitable for various degrees of exposure in gas compressor station design.

Curing.—The strength and quality of concrete are a direct function of its age and the conditions under which it cures or dries. When concrete is cured in a dry atmosphere, some of the water used in mixing is lost by vaporization and the chemical reactions between the cement and water, upon which concrete strength depends, are stopped. Hence, prevention of premature drying is important. The usual practice in gas-compressor-station construction is to sprinkle the concrete with water or cover it with wet burlap, canvas, or straw as soon as the surface has hardened somewhat.

The hardening rate of concrete is directly dependent on the average ambient temperature. High temperature accelerates hardening, low temperature retards it. Hardening or curing periods normally used in gas-compression-station construction range between 10 and 28 days, according to the local weather conditions. The longer a curing period, the better the concrete. Since many gas-compressor stations are located in moderately warm climates, particular care must be taken to see that the concrete is kept damp during entire curing period. Then, strong, watertight, and wear-resistant foundations, walls, and mats will be obtained in the station.

Laboratory Determination Of Relative Permeability

(Continued from page 102)

proaches a zero value at a higher saturation because the complex alundum capillary system has a higher residual liquid content than does a simple capillary tube system.

However, a different type of curve is to be expected for systems consisting of capillary openings of widely varying sizes, as are found in natural porous media. When this type of system is desaturated by the capillary-pressure method, the larger capillaries are the first to be emptied of the wetting phase, leaving the smaller capillaries to carry the flow of this phase. From a consideration of Poiseulle's law* and the formula for the volume of a cylinder, it may be seen that the flow rate would vary as the fourth power of the radius of the capillary, while the volume would vary only by the square of this quantity.

If a system under study consisted of a series of capillaries, varying evenly in diameter from the largest to the smallest, a wetting phase relative permeability would decrease as the square of the saturation, resulting in a parabolic curve of the type $K_r = S^2$. In Fig. 4 this curve is plotted with the abscissa (S) representing the fraction of the pore volume occupied by the flowing phase and the ordinate (K_r) representing relative permeability. Also shown in the same figure are relative permeability curves for a synthetic core of fused alundum in which a range of particle sizes was used to give a system of varied capillary sizes.

While this theoretical relative-permeability curve differs markedly from the essentially straight line which was obtained with the single capillary tube, it is quite similar in shape to the curves for both the unconsolidated sand and the synthetic core. Moreover, since the curve $K_r = S^2$ presupposes that the total volume of the fluid contributes to the fluid flow, correction of this curve for the 25 per cent of the pore volume occupied by the connate water will give a close agreement between the theoretical curve and the curve for the unconsolidated sand. The fact that the relative-permeability curve for the synthetic core decreases more rapidly with saturation than does that for the unconsolidated sand with a similar connate-water content is probably due to the presence of a greater proportion of large openings in the synthetic material.

This same concept—that as capillaries increase in size they contribute proportionally more to flow than to porosity—is borne out by the curves in Fig. 5. These curves represent a series of wetting-phase relative-permeability determinations on a consolidated sandstone core. During the first three determinations the capillary system of the core was progressively plugged by particles of infusorial earth (which was used as a contact material) being carried into the sample by the fluid flow.

This plugging action acted to decrease the size of the capillaries in which the particles were lodged and affected the larger capillary openings to the greatest degree. This action caused the curves to become progressively more flat and approach the curve for the system of essentially one size capillaries. The fourth determination was made using cleansing tissue as a capillary contact material, and since no changes in the capillary were introduced, the results fall within experimental error of those obtained in the third run. Confirmation of the existence of plugging in the first three runs is shown by the decrease in the air permeability to one-third its original value.

While the curves shown in Fig. 4 are of the type that could be expected with a capillary system of a uniform distribution of capillary sizes, most of the curves obtained on samples of natural sandstone formations deviate from these smooth curves, as can be seen in Figs. 7 and 8. These deviations are thought to be caused by the fact that most naturally occurring sandstones, while having a wide range of capillary sizes, do not have an even distribution of these sizes.

This effect is demonstrated in some cores to a marked degree by the presence of a large number of openings with the same diameter and the absence of other size openings generally expected to be present. This property is shown by the capillary-pressure curves in Fig. 6, which are for three different reservoir samples. The significance of the different shapes of these curves is interpreted below. Curve 1 represents a capillary system consisting mainly of relatively large openings, having capillary pressures less than 1 psi., while curve 2 shows the presence of two groups of capillaries characterized by capillary pressures of 0.5 and 7 psi., with a skip in sizes between the two. Curve 3 is for a system having essentially no openings with a capillary pressure of less than 2 psi. and a fairly even graduation in sizes from these down to the smallest size present.

Relative-permeability curves for oil and gas in the presence of connate water - capillary pressure desaturation.—Figs. 7 and 8 show the results and determinations of relative permeabilities to oil and gas with connate water present using a capillary-pressure method on natural sandstone samples.

It can be seen that the specimen represented in Fig. 7 was bentonitic in nature, shown by the large difference in the air and water specific permeabilities. The core sample represented in Fig. 8 gave very little difference between the air and water specific permeabilities and no difference (within experimental error) between the water and oil specific permeabilities. In this latter case no differences should be observed in the relative permeabilities to oil and to water for this sample. However, no determinations have been made on this core without connate water being present.

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*Poiseulle's law:

$$V = \frac{\pi P r^4}{8 \eta l} t$$

where

V = volume of fluid
P = pressure
r = radius
η = viscosity
l = length
t = time

BOOKS

WEST TEXAS OIL. By Frank J. Gardner. Published by Ira Rinehart, Dallas. $25 to subscribers, $35 to nonsubscribers.

This book, published in two volumes, is a plastic-ring-bound mimeographed work of some 500 pages, and is a study of the petroleum industry in 55 counties of the West Texas Permian basin, constituting Railroad Commission districts 7-C and 8. Information covered includes discovery data, recovery, number of wells producing, producing horizons, type structure, field potential, deepest tests, proration methods, pipe lines, principal leaseholders, field and county maps, and allowables. The facts and figures are drawn from the pages of journals, files, bulletins, bibliographies, individual papers, company records, government records, and newspapers.

PROGRESS IN FIELDS OF MANAGEMENT. Published by American Management Association, 330 West 42nd Street, New York.

This is a complete bibliography of the A.M.A.'s publications during the past 18 years on the following management subjects: personnel and industrial relations, insurance, marketing, office management, production, finance, and packaging. More than 600 publications, the work of more than 2,500 authors, are listed.

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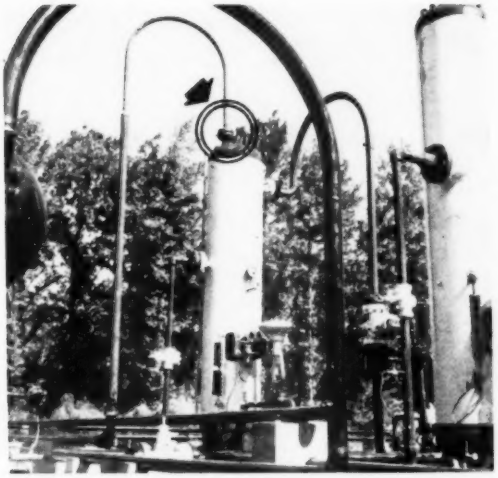

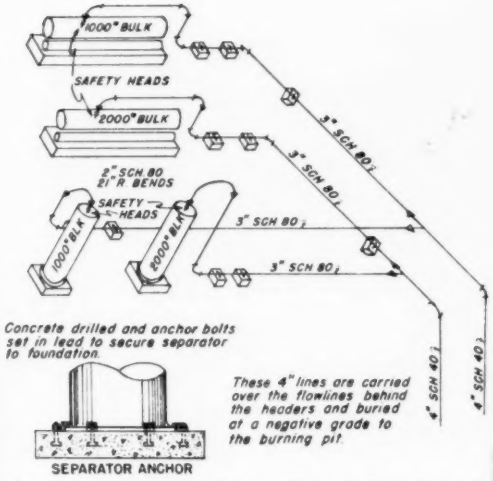
1000# BULK
SAFETY HEADS
2000# BULK
2" SCH 80 21" R BENDS
SAFETY HEADS
1000# BULK
2000# BULK
3" SCH 80
3" SCH 80
3" SCH 80
3" SCH 80
4" SCH 40
4" SCH 40
Concrete drilled and anchor bolts set in lead to secure separator to foundation.
These 4" lines are carried over the flowlines behind the headers and buried at a negative grade to the burning pit.
SEPARATOR ANCHOR

Left: Photo showing piping arrangement carrying oil and gas from high-pressure separators to burn pit. This is California Co.'s tank battery setting No. 4 at Cranfield field, Miss. Right: Construction details and equipment layout.

Vent lines for separator rupture diaphragms add safety to

High-Pressure Settings

by J. B. George*

IN the high-pressure fields of the Texas and Louisiana Gulf Coast area, it is not uncommon for a separator rupture diaphragm to blow. In addition to the hazard to operating personnel, the situation creates a definite fire hazard and damages surrounding installations, such as storage tanks.

The probability of fire is considerable since heaters are often in operation as close as 200 ft. and the pilot light in the flare pit is burning approximately the same distance away. Beside the fire hazard, it is annoying to have a rupture diaphragm blow particularly just after a setting is all cleaned up and painted. Besides the annoyance, these cleanup and painting jobs are expensive. In one California Co. field it seemed that no sooner would a setting be cleaned up and painted than a rupture diaphragm would blow on one of the separators ruining the cleanup job, since every piece of equipment in the setting would be covered with oil.

The separators used in these high-pressure settings are 2,000 and 1,000-psi. working-pressure vessels. In two-stage separation, they normally operate at approximately 1,700 and 500 psi. respectively. If, for any reason, the pressure in a separator should build up higher than the vessel should safely operate, with a safety factor taken into consideration, the rupture diaphragm blows and the unsafe condition is eliminated.

Separators are tested according to A.P.I specifications to 1.5 times the maximum working pressure. The 2,000-psi. bulk separators are tested to 3,000 psi. while the 1,000 psi. vessels would receive a factory test of 1,500 psi. These factory tests provide ample safety factor where the proper pressure rupture diaphragms are installed. The rupture diaphragms installed on these separators are 2,300 psi. for the 2,000-psi. vessel and 1,100 for the 1,000-psi. units.

Venting-System Design.

To eliminate this serious fire hazard and expensive cleanup jobs, the company's field foreman called on the field engineering staff to design a venting system. The vent system was to be designed with sufficient capacity for safely carrying the 2 300-psi. surge from the top of the separator's rupture disk to the burn pit, which is normally kept lighted as an additional safety precaution. This represented a difficult engineering assignment since it involved handling the 2,300-psi. surge off the top of the 2,000-psi. vertical separator through a 2-in. rupture outlet.

The initial connection and bend in the 2-in. coming off the top of the vertical separator required the most thought in predesign work. It was accomplished by welding holddown safety-head companion flanges into 2-in. schedule 80 that made a 180° bend with a 21-in. radius. This is shown in the center of the accompanying photograph. The 2-in. schedule 80 tied into a 3-in. schedule 80 riser which was well anchored at the base before it continued to join the remainder of the 3-in schedule 80 gathering system coming off the other three separators. The diagram shows the piping and anchoring of the entire venting system for all separators in the setting and how it ties into the two 4-in. schedule 40 buried lines going to the burn pit.

After the engineering and design work was completed, considerable discussion developed among field men as to the safety of the installation. Several were skeptical of the 2-in. schedule 80 bend (shown in the picture) and were afraid it would not take the 2,300-psi. surge from the high-pressure bulk separator. As a result of this discussion, an installation was made at one setting so the vent system could be tried for safety.

Upon completion of the installation, all wells but one bypassed the setting, to flow directly to the cycling plant. All outlets from the vertical 2,000-psi. separator were blocked and one well with 2,575 psi. tubing pressure was turned slowly into the separator. With all observers standing on a hill some 250 ft. away, the diaphragm on the separator blew and the 2,300-psi. surge was carried directly to the burn pit with a thundering blast that did not in any manner shake or vibrate the venting installation.

*Safety engineer, The California Co., New Orleans, La.

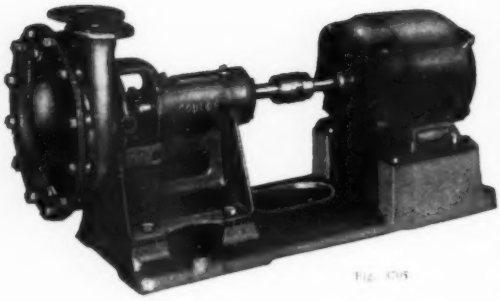

Fig. 3705

FOR OUTSTANDING SERVICE HANDLING CORROSIVE LIQUIDS—

Goulds new stainless steel centrifugals

ADVANCED PUMP DESIGN —

The Goulds 3705 stainless line represents the last word in effective design. Fig. 3705 pumps will give you efficient, dependable, 24-hour service in handling corrosive liquids—at low cost.

CAPACITIES —

Goulds stainless steel centrifugals are made in 8 sizes with capacities to 750 G.P.M. and heads to 180 ft. depending upon capacity.

ADVANTAGES —

Exceptional efficiency (see Bulletin for performance curves) plus extreme simplicity make this an ideal pump for corrosive applications. High interchangeability of parts cuts stocking problem. Quick inspection or cleaning—simply remove casing cover without disturbing pipe connections.

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Write for Bulletin 725.3 for complete details on this new stainless steel pump.

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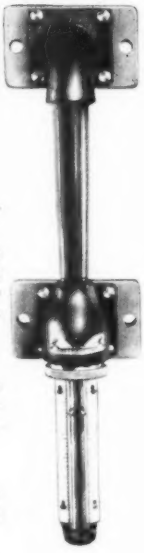


Fig. 483
FLOGUIDE METER

WHAT DOES IT DO?
Indicates gas flow rates accurately.

HOW DOES IT WORK?
A stainless steel "float" moves in a tapered, precision-bore stainless steel metering tube set vertically with the small end down. Instantaneous flow rate is read directly on a scale.

WHAT CAPACITIES?
¾" to 4" pipe sizes. SCFH: Carbon Dioxide—45 to 16,000; Hydrogen—200 to 76,000; and comparable capacities for other industrial gases.

PRESSURE RATINGS?
Primarily designed for low pressure service; can be supplied to withstand 600 psig.

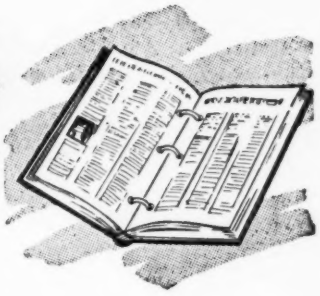
INSTALLATION?
Fits right into the pipeline, and is easily panel-mounted.

MORE INFORMATION? Write for Catalog 47.

FISCHER & PORTER CO. DEPT. OM2-3E HATBORO, PA.

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Instrument Identification

BEFORE the basic elements and applications of refinery instrumentation can be discussed, it is necessary to review the system of letter identification by which instruments may be designated on flow and piping diagrams and in preparing instrument schedules and requisitions. No "official" system exists for instrument identification. There is, however, fairly good agreement as to the system of basic letters and their order of combination in designating the most common applications of instruments for indicating, recording, and controlling temperature, flow, pressure, and level in the refinery.

This provided a basis for the system reproduced here which was prepared by the Subcommittee on Instrumentation Flow Plan Symbols and presented at the 1949 meeting of the Instrument Society of America. As such it represents at least an approach or start toward an official system and for this reason is repeated on this page by way of introduction to the subject of refinery instrumentation.

It is, of course, realized that neither this system nor any other existing system fully covers to the satisfaction of everyone all the possible letter combinations that may be used to designate the many instruments and their applications. It is suggested that where additional details regarding an instrument or its application are required these be added in the form of notes placed next to the instrument symbol rather than resorting to additional symbols and a greater number of letter combinations.

TABLE 1—LETTERS OF IDENTIFICATION

	Definition, and permissible positions in any combination		
Upper case letter	First letter* Process variable or actuation	Second letter Type reading or other function	Third letter Additional function
A		Alarm	Alarm
C	Conductivity	Control	Control
D	Density		
E		Element (primary)	
F	Flow†		
G		Glass (no measurement)	
H	Hand (actuated)		
I		Indicating	
L	Level		
M	Moisture		
P	Pressure†		
R		Recording (recorder)	
S	Speed	Safety	
T	Temperature†		
V	Viscosity		Valve
W	Weight	Well	

*When required the following may be used optionally as a first letter for other process variables: (1) "A" may be used to cover all types of analyzing instruments. (2) Readily recognized self-defining chemical symbols such as CO_2, O_2, etc., may be used for these specific analysis instruments. (3) The self-defining symbol "pH" may be used for hydrogen ion concentration. †Although not a preferred procedure, when considered necessary it is permissible to insert a lower case "r" after "F" to distinguish flow ratio. Likewise, lower case "d" may be inserted after "T" or "P" to distinguish temperature difference or pressure difference.

TABLE 2—COMPLETE GENERAL IDENTIFICATIONS (COMBINATIONS OF LETTERS)

		Second and third letters* (type of device)												
		Controlling devices					Measuring devices			Alarm devices				
		Separate controllers												
Process variable (or actuation)—	First letter	Recording	Indicating	Blind	Self-actuated (integral) regulating valves	Safety (relief) valves	Recording	Indicating	Glass devices for observation only (no measurement)	Recording	Indicating	Blind	Primary element	Wells
			-IC	-C	-CV	-SV	-R	-I	-G	-RA	-IA	-A	-E	-W
Temperature	T-	TRC	TIC	TC	TCV	TSV	TR	TI	XX	TRA	TIA	TA	TE	TW
Flow	F-	FRC	FIC				FR	FI	FG	FRA	FIA		FE	XX
Level	L-	LRC	LIC	LC	LCV		LR	LI	LG	LRA	LIA	LA		XX
Pressure	P-	PRC	PIC	PC	PCV	PSV	PR	PI	XX	PRA	PIA	PA	PE	XX
Density	D-	DRC	DIC	DC			DR	DI	XX	DRA	DIA			XX
Hand	H-		HIC	HC	HCV		XX	XX	XX	XX	XX		XX	XX
Moisture	M-	MRC	MIC	MC			MR	MI	XX	MRA	MIA	MA	ME	XX
Conductivity	C-	CRC	CIC				CR	CI	XX	CRA	CIA	CA	CE	XX
Speed	S-	SRC	SIC	SC	SCV	SSV	SR	SI		SRA	SIA	SA		XX
Viscosity	V-	VRC	VIC				VR	VI	VG	VRA	VIA			XX
Weight	W-	WRC	WIC				WR	WI		WRA	WIA		WE	XX

*The optional additional process variables given in footnotes of Table 1, when used, shall be combined with second and third letters as per above. Impossible combinations = XX. Improbable combinations = .

No. 7 in current series of The Refiner's Notebook

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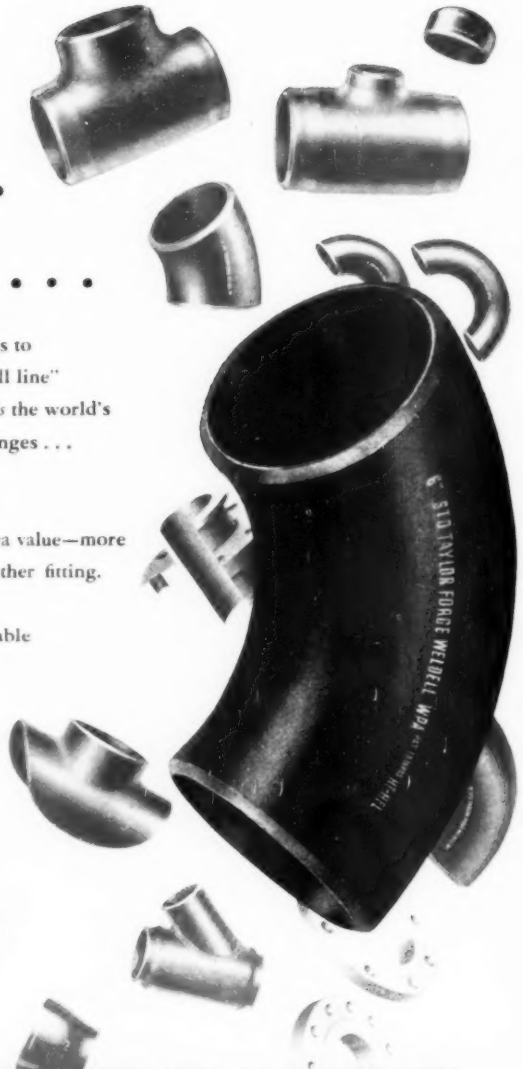
FULL SERVICE . . . .



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OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 MULTI-LAYER MANUFACTURE AND ASSEMBLY. an eight-page picture story of the various steps in fabricating these multi-layer process vessels; also explains advantages and illustrates opening accessories. *A. O. Smith, Corp.*

2 ANTI-PRECIPITATING AGENTS is a technical folder regarding the use of antiprecipitating agents for the prevention of scale, deposits and corrosion in cooling systems, plant water lines, heat exchangers, and other process equipment. It includes a flow chart of plant cycle showing where corrosion may occur. *E. F. Drew & Co.*

3 CORROSION-RESISTANT VALVES. Technical information bulletin No. 3 on Aloyco jacketed valves, in addition to sectional illustrations and descriptions, contains complete dimension tables. *Alloy Steel Products Co., Inc.*

4 BANTAM SEPARATORS contains specifications, capacities, and detailed engineering drawings of a group of low-cost separators for small wells and leases, that offer a range of operation up to 2,000 psig. *Black, Sivalls & Bryson, Inc.*

5 IOWA VALVES. All valves described in this booklet are double disk and work equally well with the pressure on either side of gate, and can be furnished with Dresser, Victaulic, Universal couplings in addition to other common types. *Iowa Valve Co.*

6 COIL-O-CLAVE describes the construction of a new process kettle that incorporates a series of steel tubes welded integrally with ample metal for heat transfer, into the exterior walls of the vessel. Coils can be arranged in parallel groups to give uniform temperature over entire vessel and a high rate of heat transfer. *Union Iron Works.*

7 TECHNICAL BULLETIN NO. 103D describes in full detail a method of applying corrosion-resistant linings of polyethylene to the interiors of storage tanks and drums subject to deterioration by chemical reaction. *Schori Process Division, Ferro-Co Corp.*

8 DIESEL ENGINES presents all technical data on vertical diesel engines manufactured in Britain. Models range from 22 to 1,040 b.h.p. *National Gas & Oil Engine Co., Ltd.*

9 GAS SCRUBBERS. In addition to sectional views, engineering data, and complete dimensions, this 12-page booklet features installations in service and advantages. *Thermix Corp.*

10 SIGMA PROCESS PUMPS TYPE HO-N, a four-page folder, features a unit designed for difficult pumping conditions involving high temperature and corrosive liquids. Pump has an output of 85 to 1,000 g.p.m. (Imperial) and delivery heads of from 100 ft. at 2,950 r.p.m. to 650

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ft. at 3,500 r.p.m. *Sigmund Pumps, Ltd.*

11 TRI-CLAD HIGH-SPEED SYNCHRONOUS GENERATORS. An eight-page, two-color bulletin deals with generators for standby, portable, and prime source power in widespread fields of application. Profusely illustrated, it gives three typical installation stories, describes Tri-Clad protection, and tells about construction features, mechanical modifications, and performance data. *General Electric Co.*

12 ROTO-GRIT-BLAST. To show the effect of cleaning and etching to assure permanent bond of primers and coatings, a 4-in. pipe sample which shows appearance of pipe both before and after being processed by Roto-Grit-Blast machine, is being offered. *Hill, Hubbell & Co.*

13 VERTICAL SPEED REDUCERS describes Nu and Nd type vertical speed reducers. Also described is the type CU, especially designed for use as a cooling-tower drive. Engineers' drawings and pertinent data included. *Cleveland Worm & Gear Co.*

14 CORROSION CAN BE STOPPED. Parancor, a permanent plastic coating for pipe lines and other industrial equipment under water, underground, and in industrial plants, is described in a new four-page folder. Results of test cases are featured. *Pipeline Protection Co.*

15 UNI-BEAM, a unidirectional force-measurement device for new dynamometer installations or replacement of old torque measuring equipment is described. This self-contained, easily installed unit eliminates knife edges and reversing linkage. *Link Engineering Co.*

16 ROPE SOCKETS AND SPIKE PULLERS, is a four-page brochure dealing with a quick-action rope socket that can be installed in a few minutes without tools, and a detachable-jaw spike puller. *Bowdil Co.*

17 WHY GROPE, a two-color brochure, describes test instruments for measuring insulation resistance, ground resistance, and insulation breakdown. *Associated Research, Inc.*

18 WELDING AND CUTTING EQUIPMENT AND SUPPLIES is a 24-page catalog listing torches, regulators, cutting and welding tips, welding outfits, solder and braze outfits, mold drying torches, machine cutting torches, adaptors, connectors, and special-purpose equipment. *Liquid Carbonic Corp.*

19 REVISED PIPE TOOLS CATALOG. Products are illustrated in color and operational advantages are fully explained in the text. Ordering specifications are concise and clear. *Beaver Pipe Tools, Inc.*

20 BUCKEYE DITCHING EQUIPMENT. This new catalog fully explains the features and application of Buckeye Models 120 and 160 service ditchers. *Gar Wood Industries, Inc., Findlay Division.*

21 OK GLASS FIBER REINFORCEMENT is an eight-page booklet giving the physical characteristics and application use of Oklahoma Glass Fiber Reinforcement for positive reinforcement of pipe-line enamels. It covers the causes of corrosion and methods of combating, both by coatings and reinforcement and the use of cathodic protection. *Oklahoma Glass Fiber Corp.*

22 GASOLINE-DRIVEN ELECTRIC PLANTS. This eight-page, two-color booklet covers the complete line of Onan gasoline-driven electric plants, ranging from 260 to 35,000 watts, in all standard voltages, frequencies, and phases. Direct-current models in standard voltages are described in ranges from 750 to 15,000 watts. *D. W. Onan & Sons, Inc.*

23 NHS AND NHRS ENGINES. Complete specifications for automotive and industrial models supercharged, six-cylinder diesel, the 275-hp. NHS engine and the 300-hp. NHRS engine, are contained in two bulletins. Five models are shown in each horsepower class for all types of highway, off-highway and industrial and power applications. The bulletins contain installation drawings, photographs, and charts on torque, horsepower, and fuel consumption, in addition to general specifications for standard equipment. *Cummins Engine Co., Inc.*

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OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Dan B. Miller

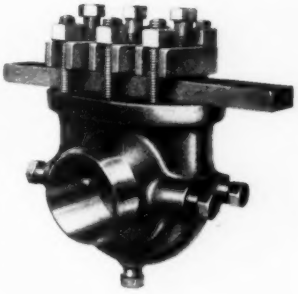
24 RUBBER-HIDE. A rubber protector designed to be laced onto hose at the point where the hose bumps or rubs against girths and tong lines is made of reinforced two-ply automobile thread stock rubber and is designed as economical protection for rotary hose, against cuts and bruises. Rubber-Hide protectors are manufactured in lengths of 6 ft. to fit 2½ and 3-in. hose. It is also available in rolls of 60 ft., convenient for cutting into any desired lengths at the rig. Rubber-Hide can be laced into place at any point along the rotary hose that is subject to abrasive wear. Furnished with sufficient lacings for the entire length of the protector. *Goodall Rubber Co.*

IT'S NEW CHECK IT

25 MOBILE CRANES. Small, compact, capable of getting close to the job, cranes of this range, from 1¾ to 15 tons, are self-propelled and are powered on the gasoline-electric principle, which contributes to smooth operation. They are particularly adaptable to operation in confined spaces. Over-all height of the 7½-ton crane, with boom horizontal, is 11 ft. 3 in. The crane is economical in operation and its versatility is increased considerably by the 360 swing of the boom. Operator sits well forward and always has full view of the load. *Coles Cranes, Inc.*

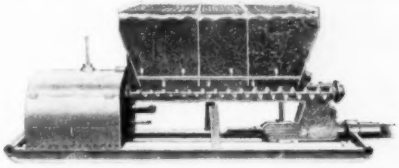
IT'S NEW CHECK IT

26 ORIFICE MASTER PLATE HOLDER, designed to replace old-style orifice flange unions, is applicable in installations where cold working pressures do not exceed 1,000 lb., and where the line may be bypassed or shut off from flow during period while orifice plate is being changed or inspected. With this installation, it is not necessary to jack apart orifice flanges. Orifice plate may be changed quickly and the operator is assured of accurate recentering of the plate and consequent increased metering precision. Provided in two types: the welding neck body and the socket weld body. *Robinson Orifice Fitting Co.*



IT'S NEW CHECK IT

27 TRI-MIXER. The large 30-sack screened bin has three separate compartments for different materials and, using its four-speed feed, can mix as many as 20



sacks a minute or as few as 2½ sacks per hour. The drive can be electric or steam. Operated with mud pump connected to an inlet on its mixing chamber, it assures uniform mixture and weight of drilling mud through controlled feed from its hopper to a screw conveyor and the utilization of a high-pressure spray of fluid through a nozzle, injected by the mud pump into its mixing chamber. Screw shaft and secondary paddle installed above it to prevent material clogging, are mounted in self-aligning roller bearings. High-pressure spray assures

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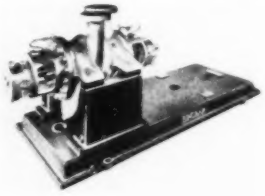
positive mixture of fluid and dry materials before flowing into the suction pit. *Republic Supply Co.*

IT'S NEW ✓ CHECK IT

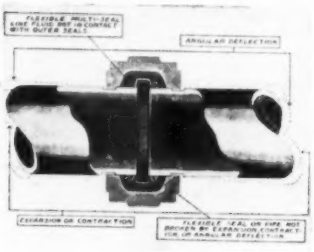
28 TYPE CK, KOKE-KRUSHER. A nonclogging centrifugal pump designed especially for the pumping of oil under high pressure, has been field proven in oil refineries for the severe services of pumping oil products such as residuum, flash tower bottoms, and black-oil recycle. Feature of the pump is a crushing mechanism located in the suction chamber immediately in front of impeller eye.



The Koke-Krusher comprises only one moving and one stationary part. The stationary part extends axially outward and radially inward from wearing ring a two points 180 apart. The moving part has multiple spiral rows of integrally cast, radially extended, hardened cutters. As the shaft rotates, the tips of the cutters pass under without touching the stationary member. *Bingham Pump Co.*

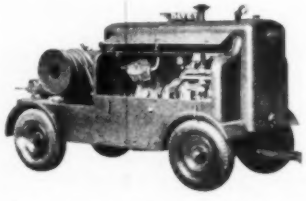
IT'S NEW ✓ CHECK IT

29 DILLON FLEXIBLE-LOCKED COUPLINGS are available in sizes 2 to 20 in. They are grooved-type couplings with a two-part, self-aligning housing made of malleable iron and designed for great strains under pressure or vacuum. Provides great flexibility without leakage and is valuable for pipe lines in earthquake areas and where great temperature changes cause expansion and contraction. Can be used on pipe lines, christmas trees, tank connections, valves, and separators. Multiseals at each end of the pipe are not in contact with the fluid in the pipe, and insure leakproof joints. Housing and multiseal gasket permit a deflection of over 5 angular. *Dillon Co.*



IT'S NEW ✓ CHECK IT

30 AIR CHIEF AIRISTOCRAT. These compressors incorporate advanced design and accessory features including an extra heavy welded steel, vibrationless frame; electric starting; fenders; locking gas cap; hand parking brakes, and electric service brakes. The latter can be connected to the braking system of any vehicle used to tow the compressor. Two hose reels, each 150-ft. capacity, are provided. Tires are 7:00 by 16, mounted on heavy-duty truck wheels. Capacities: 105 to 315 cu. ft. per minute. *Davey Compressor Co.*

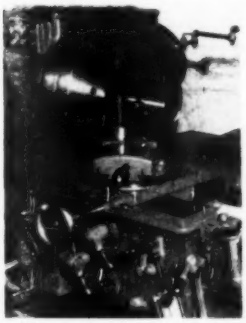


IT'S NEW ✓ CHECK IT

31 PIPE FITTERS CENTER-FINDER, MODEL PF. Features of the Center-Finder include the following: The revolving dial with the four levels is marked in both degrees and inches per foot. The tool weighs only 6 oz. Pocket size, it measures 6 by 4 by $1\frac{1}{4}$ in. overall. The center-punch is made of No. 416 stainless steel. Point is hardened and will punch milled steel. Frame is a magnesium casting; all other parts are brass or stainless steel. All faces are drilled and ground. The witness marks on the frame are cut with a jeweler's rotary saw. *Interstate Sales Co.*

IT'S NEW ✓ CHECK IT

32 TOOL JOINT THREADING ATTACHMENT. A fast, automatic, accurate attachment for all Lehmann lathes, this tool-joint threader will reduce threading time even when operator is inexperienced. All operations are automatic and errors are eliminated. A 4-in. tool joint can easily be threaded in 15 minutes. It can be set for external or internal threads, for right or left-hand threads, and for straight or tapered threads. It will disengage and stop tool at the same place no matter what the speed, and will close to a shoulder without thread relief and with perfect safety. *Lehmann Machine Co.*



IT'S NEW ✓ CHECK IT

33 V-BAND COUPLINGS for all types of flanged joints provide an effective seal where a rigid high-strength connection is required. Suitable flanges to accommodate a V-band coupling can be made integral with, or added to the tubing or ducts to be joined. Rolled sheet-metal flanges or machined flanges are equally adaptable and joints can be made with or without gaskets. Couplings are made in continuous-band, segmented-band, and ventilated-band types, and feature light weight with great strength, quick disconnect provision, and extreme dependability over a wide range of temperature, pressure, and strength requirements. *Marman Products.*

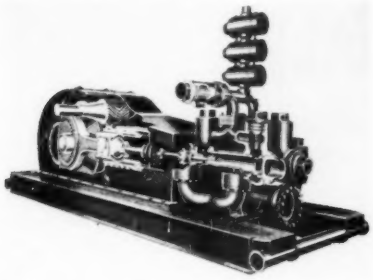
IT'S NEW ✓ CHECK IT

34 COREXIT, a new chemical inhibitor for sulfide corrosion in producing oil wells, incorporates the following properties: it is a free-flowing liquid; has no objectionable odor; is nontoxic; and is available at reasonable cost. One test of Corexit was started in W. R. Settles 11 and 12, Howard-Glasscock field, early in 1949. Each of these wells pumped continuously from a depth

of about 2,400 ft. and produced about 30 bbl. each of oil and water per day. Rod failures were few, but tubing failures were frequent. A string of tubing which consisted of 600 ft. of new plastic-coated pipe and partly of black pipe in good condition was installed in 1948. When this string was pulled for inspection late in the year, it was found that many of the joints of both new and second-class pipe were badly corroded and the mud anchor was completely penetrated. Injection of Corexit was started in February 1949. Since the start of the test there have been no tubing leaks in this well resulting from corrosion. After the initial treatment, the inhibitor was used in amount such that the daily cost of chemicals ranged from 50 cents to 1 dollar. *Humble Oil & Refining Co.*

IT'S NEW ✓ CHECK IT

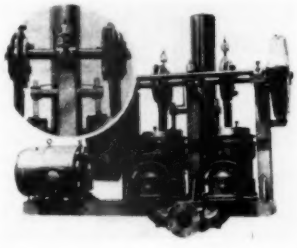
35 DUPLEX POWER SLUSH PUMP meets the specialized mud-circulating requirements of deep drilling. Identified as the D-850, this new duplex power pump has an 8¼-in. maximum liner diameter, 18-in. stroke, and is rated at 850-hp. input at 60 r.p.m. It is capable of delivering 933 g.p.m. at 1,328 psi. with 8¼-in. liners. Cast-steel



fluid end and fabricated-steel power end materially reduce pump weight and provides greater strength, rigidity, and ruggedness. Valve-pot covers and cylinder heads are held to the cylinders by very heavy, coarse-pitch threads. *Emsco Derrick & Equipment Co.*

IT'S NEW ✓ CHECK IT

36 CROSSHEAD GUIDE ASSEMBLY. Designed to increase pumping efficiency and cut maintenance time, this exclusive new feature can be furnished when specified on both Carter standard and balto models, in all three sizes, single, double, and triple plunger. Consists of a steel crosshead guide rod, rigidly secured to each plunger; the guide rod travels through bronze guide bearings in a vertical plane with plunger. Bronze guide bearings are securely mounted on, and supported by vertical stanchion of pump base. Advantages of this design are to eliminate misalignment of the plunger, and any tendency toward eccentric motion of the plunger in the vertical path. *Ralph B. Carter Co.*

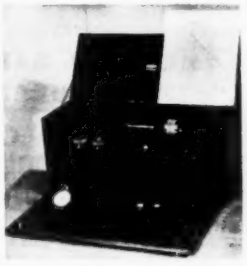


IT'S NEW ✓ CHECK IT

37 VISUAL PANEL BOARDS. Companies have successfully built visual panel boards on perforated masonite, linoleum, or aluminum boards to show plant operations, changes, or work in progress. These boards are perforated to order and come in shapes and sizes to fit into your control room. Excellent for training new personnel since flow diagram can be built to coincide with your instrument panel, assisting new personnel to understand the complete operation of the plant. *Harrington & King Perforating Co.*

IT'S NEW ✓ CHECK IT

38 PORTA-PERM is a new design of portable permeameter for determining the horizontal and vertical permeability of core samples at the well or in the laboratory. By means of a rubber bulb, the air pressure in the chamber is increased. As the air passes through the sealed-off sample, the pressure in the chamber drops. This drop is indicated by a falling water column in a glass tube, and is timed by a stop watch. Curves are furnished of time vs. permeability; thus, permeability may be read directly and quickly. *Guenther Instrument Co.*

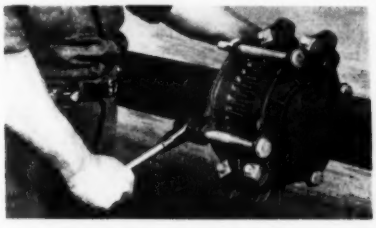


IT'S NEW ✓ CHECK IT

39 NEW ION-EXCHANGE PROCESS. Extraordinarily pure water containing less than one part of ionic solids per 100 million parts of water, can be produced by passage through a mixed bed of Amberlite ion-exchange resins. The technique permits complete removal of inorganic salts without deviation from chemical neutrality, pH 7.0. Other advantages include: reduced costs of both equipment and regeneration; lower rinse requirements; uniform performance in intermittent service; and a sharp breakthrough at depletion of the bed. *Rohm & Haas Co.*

IT'S NEW ✓ CHECK IT

40 NEW METHOD FOR QUICK SHUTOFFS when converting to natural gas. Shutoff is made by cutting



the pipe, inserting a thin disk of 18-gage steel, and applying a Seal Split Coupling Clamp. When shutoff has been completed the line may be reopened quickly by loosening the clamp, removing the disk, and resealing the clamp. *M. B. Skinner Co.*

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The opening pressure of a Camco Valve is the result of two forces operating together. These two forces—nitrogen charged Camcoized bellows and a compressed stress-equalized Monel Spring — have proved the answer for a perfectly operating and dependably durable gas lift valve. Thus, this exclusive Camco design provides a gas lift valve that gives correct, positive action under the most severe well conditions and eliminates any possibility of scrambled pressures.

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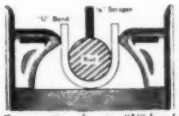
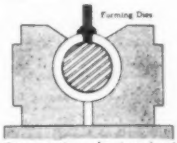
USE CRALL SPIRAL PARAFFIN SCRAPERS

CRALL Spiral Paraffin Scrapers are designed to fit any sucker rod. They are sturdily constructed, but average only six ounces each in weight. Scores of major and independent oil-producing companies are now using CRALL Scrapers to their complete satisfaction.



Cross section showing "U" band being die-formed around rod to the scraper blades.



Cross section showing band held under pressure around rod while ends of band are shrink-grip attached to scraper blade.

1. Scrapers alternate — one right one left — eliminating tendency of the rod to unscrew.
2. No work at well. Scrapers are attached at our factory, and stocked at supply stores.
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NATURAL GAS

Tennessee Gas Transmission Seeks to Expand Capacity

Tennessee Gas Transmission Co., Houston, is seeking to expand the daily capacity of its pipe-line system it plans to build for natural-gas service to Ohio, New York, and New England, by 50,000,000 cu. ft.

The firm told Federal Power Commission in Washington, D. C., last week that the additional cost would be $24,668,000, bringing the total cost of the project to $118,644,000. FPC said it would begin a hearing on the proposal on March 7.

Tennessee Gas applied last August for permit to expand its pipe-line system by 200,000,000 cu. ft. daily, at an estimated cost of $93,976,000. Now it seeks to raise the capacity to 250,000,000 cu. ft. daily.

The proposed expansion would make natural gas available to firms that now distribute manufactured gas in Ohio, New York, and New England. It also would provide additional natural-gas supplies to Tennessee Gas' present customers or their affiliates, and to one new customer on the existing system.

Mississippi River Fuel Proposes Capacity Increase

Mississippi River Fuel Corp., St. Louis, has amended an application filed with Federal Power Commission in September 1949, and is now proposing to increase daily sales capacity of its natural-gas transmission system to 375,000,000 cu. ft. by installation and operation of additional compressor units in Louisiana, Arkansas, and Missouri.

The company plans to install compressor units totaling 27,000 hp. in seven new stations, and additions totaling 5,000 hp. in two previously authorized stations. The seven new stations are to be built by a third party at an estimated cost of $5,400,000 and leased to Mississippi. The compressor facilities to be added by Mississippi to its existing stations are estimated to cost $1,351,000.

As proposed originaliy in the application filed last September, Mississippi planned to increase the daily sales capacity of its system to 328,000,000 cu. ft. by the installation of 13,000 hp. in compressor units in three new stations and additions totaling 3,000 hp. to two previously authorized stations.

The company proposes to use the additional facilities to meet the increased demands of its existing customers; to deliver natural gas for distribution in 29 communities in Arkansas and Missouri which are now without natural gas service; and to connect additional main-line customers which will use natural gas for industrial purposes in Arkansas, Missouri and Illinois.

Mississippi's transmission system extends from northern Louisiana through Arkansas and Missouri and into Illinois. The company sells natural gas to utility distributing companies for resale for domestic, commercial, and industrial purposes, and directly to certain industrial consumers. Its principal sales are made in Illinois and Missouri in the vicinity of St. Louis and East St. Louis, and Alton, Ill.

Texas Attorney General Rules on El Paso Status

AUSTIN.—Price Daniel, Texas attorney general, has ruled that El Paso Natural Gas Co. is a "gas works" and subject to the occupation tax on gross receipts.

The opinion held that taxes on the local sale of gas to ultimate consumers are not prohibited by a commerce clause of the federal Constitution.

Gas Deliveries to Pipe Lines in Kansas Increases

Delivery of natural gas to pipe lines in Kansas at 16.4 psi. totaled 263,225,963,000 cu. ft. during 1949, the Kansas State Corporation Commission reported recently. This compares with 216,837,856,000 cu. ft. during 1948, or an increase of 46,388,107,000 cu. ft.

Normal psi. for delivery of gas to pipe lines is 14.65. The largest gas-producing field, the Hugoton field, produced and delivered to pipe lines in 1949 a total of 221,420,225,000 cu. ft. This compares with 116,039,208,000 cu. ft. in 1948.

Arkansas Natural Proposes Corporate-Structure Change

A plan was filed with Securities and Exchange Commission in Washington, D. C., recently by officials of Arkansas Natural Gas Corp., for the simplification of the organization's corporate structure. Under the plan, the corporation would become two separate organizations.

H. C. Walker, Jr., president, said the plan provides for complete separation of the gas distribution, pipe lines, and ancillary gas-production properties from the oil producting and marketing properties, and the other gas properties.

The gas distribution, pipe lines and production properties would be owned by Arkansas Louisiana Gas Co., and the other properties would be the property of Arkansas Natural Gas Corp., which would become an operating company by its merger with Arkansas Fuel Oil Co.

Natural Gasoline

Two Gasoline Plants Slated For Scurry County, Texas

Two natural-gasoline plants will be constructed in Scurry County, Texas, which will be capable of processing 70,000,000 cu. ft. of casing-head gas daily. Contract has been let for construction of one of the plants, in the Kelley pool, and announcement has been made for a high-pressure absorption-type casing-head-gas plant for North Snyder field.

Standard Oil Co. of Texas is planning the immediate construction of the North Snyder plant. It will have an initial capacity of 30,000,000 cu. ft. of gas daily, and is to be located near the center of that company's acreage, approximately 7 miles north of the town of Snyder. Completion is scheduled for mid-1950.

Fullerton Oil Co. has let contract to Hudson Engineering Co. for the construction of a refrigerator-type natural-gasoline plant in the Kelley pool. It will be located in the northwest quarter of Section 249, Block 97, H&TC Survey, and is scheduled for completion in July. Its rated daily capacity is 40,000,000 cu. ft.

According to reports, Fullerton is negotiating with Lone Star Gas Co. and El Paso Natural Gas Co. for sale of the plant's residue gas. Principal source of gas supply will be from Magnolia Petroleum Co. leases in the area.

At least two other plants are in the drafting stage in the Scurry area. Lion Oil Co. is planning to construct a 566-well plant of about 40,000,000 cu. ft. capacity to take gas from the Diamond-M and Sharon Ridge area. In the North Snyder portion, Barnsdall Oil Co. is planning construction of a 26,000,000 cu. ft. natural-gasoline plant, which probably will be jointly owned, with Barnsdall serving as operator.

The gas-oil ratio of Scurry reef wells is low, but the liquid hydrocarbon content of the gas is exceedingly high. Gas analyses made by one company indicate that more than 6 gal. of propane and heavier products per 1,000 cu. ft. of gas may be recovered if producers conduct their operations to secure a stabilized crude.

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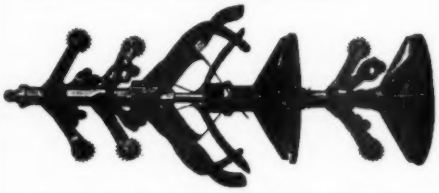

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PIPE LINES

Montana-Dakota Contracts 340-Mile, 12-in. Line

Montana-Dakota Utilities Co. awarded contract to R. A. Conyes Construction Corp. for a 340-mile, 12-in., natural-gas line, according to R. M. Heskett, president and general manager.

The new line will extend from the Worland field, Washakie County, Wyoming, to the company's Cabin Creek station, Fallon County, Montana. If ground conditions permit, it is expected that pipe laying will start in April or May.

Work on the right-of-way will begin next month according to R. A. Conyes. Locations for the two spreads have not yet been determined. The Conyes operations will be supervised by Al Poggi, general superintendent, Chester Kincaid and Jimmy Alman, superintendents. Fred King will be office manager.

Conyes' headquarters are at 2884 San Pablo Avenue, San Pablo, Calif. Conyes participates in Bechtel-Price-Conyes Corp. which is building the 506-mile, 34-in. line for Pacific Gas & Electric Co.; he has been engaged with Bechtel in the laying of the Trans-Arabian project.

Mid-Valley Contracts for Longview-Haynesville Job

Mid-Valley Pipe Line Co. (Sun and Sohio) has awarded a contract to O. R. Burden Construction Co. for laying 110 miles of 20-in. between Longview, Tex., and Haynesville, La. Work is expected to start soon. Letting of the Longview-Haynesville section was omitted from the Mid-Valley program several months ago when construction was contracted for the remainder of the company's 1,153-mile, 20-22-in. crude-oil line now being built from Longview to Lima, Ohio.

The O. R. Burden organization expects to resume work to finish the 75-mile, 12-in. section north of Des Moines, Iowa, for which 80 per cent of the pipe was laid before shutdown due to interrupted pipe deliveries and weather conditions. G. D. Lewis, spread man, operates from a field office at Nevada, Iowa.

Pan American to Construct Scurry County Crude Lines

A crude-oil gathering system in the Kelley field of Central Scurry County will be constructed by Pan American Production Co. When the system is completed, the company will become a purchaser of crude production in that field.

The gathering system to be built in the Kelley field will connect with the Basin Pipe Line System's line near Colorado City, in Mitchell County, Texas. The trunk will deliver Pan American's oil to refineries in the Chicago area.

Officials indicated the system will be able to handle between 20,000 and 30,000 bbl. of oil daily from the Kelley field. Future plans call for the

NEW PUMP STATION.—This new all-electric pumping station was completed recently by Deep Rock Oil Corp. at the Seminole, Okla., end of its Seminole-Bristow-Cushing lines. The station previously located in this area was subject to frequent flooding by nearby creeks, and this new unit was installed on higher ground. Gathering lines in the Seminole area run to this station, which sends oil on up the lines to the company's Cushing refinery.

CRC

PIPE LINE CONSTRUCTION EQUIPMENT

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Pipe Line Equipment and Materials
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possible connection with a common-carrier pipe line to the Gulf Coast, and when that outlet is available, a part of Pan American's oil purchases in the Scurry County area will be moved to the coast for the firm's own use. Magnolia Pipe Line Co. and Pasotex Pipe Line Co. are currently purchasing Scurry County oil and moving it out in their own pipe lines.

Texas-New Mexico Pipe Line Co. is constructing a line into the county's canyon reef fields, which will move out crude to be purchased by Cities Service Oil Co.

The gathering system and discharge line of Pan American to the Basin system is slated to be in operation by April 1.

Gulf Lays Lateral to Snyder, Tex., Area

Gulf Refining Co., Houston pipeline division, let contract early this week and began pipe laying for a 30-mile, combination 8-in. and 10-in. crude oil line which will have a capacity of 20,000 to 25,000 bbl. daily to handle Scurry County, Texas, production.

The line will be a lateral extending from Roscoe station to Snyder. The Roscoe pump station is on the Gulf trunk line from West Texas to Port Arthur, Tex. The lateral is to be finished in 60 days. It is reported that plans for gathering lines have not been completed.

Southern California To Lay 80-Mile Line

Southern California Gas Co. is planning construction of 80 miles of 30-in. from Whitewater to Puente, Calif., scheduled for completion September 1.

The company's big-inch construction program in California completed to serve this winter's demands total 38½ miles, consisting of the following projects: Rivera to Inglewood, 15 miles of 30-in. and El Monte to Puente, 6½ miles of 30-in., both contracted by Alex Robertson Co., and Encino to Thousand Oaks, 17 miles of 20-in., contracted by Signal Pipeline Construction Co.

General Petroleum Completes 14-Mile Line

General Petroleum Corp. has announced completion of a new 14-mile crude-oil pipe line from the Gooseberry field, Park County, Wyoming, to the Grass Creek field, where it connects with a line which serves several refineries.

Constructed almost entirely through mountain terrain, the line is of welded construction and coated throughout its entire length with coal-tar

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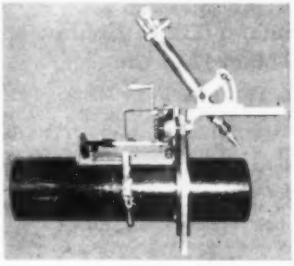
With
Maximum SPEED
Minimum COST



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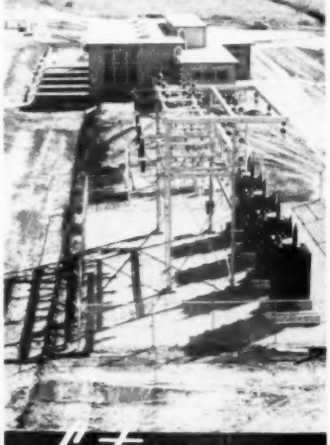

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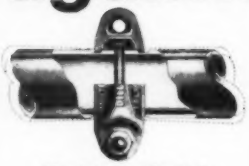

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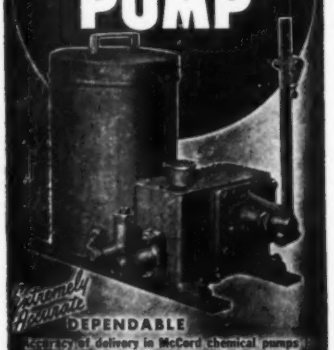

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enamel and asbestos-felt wrap. It follows the Gooseberry Valley for 9 miles, then crosses several ridges to the Grass Creek Valley. Three bridges were constructed over gullies en route to provide access for construction workers.

Paralleling the new line is a 2-in. welded and coated line from the Grass Creek field for natural gas, to provide for the producing and oil-treating equipment in the Gooseberry field.

The Gooseberry field was discovered several years ago by General Petroleum. Between 500 and 600 bbl. of 23 -gravity oil are produced daily.

Initial Deliveries of Gas Made Through 800-Mile Line

Two of the country's newest long-distance transmission lines began moving new supplies of natural gas destined for cities in Ohio, Pennsylvania, and Upper New York State last week.

Initial deliveries were made at Middletown, Ohio, where Texas Gas Transmission Corp. has a contract calling for the delivery later this year of up to 235,000,000 cu. ft. of gas a day through its new $73,500,000 800-mile Texas-to-Ohio pipe line.

These supplies were delivered through the recently completed Texas Gas line into the Big Inch pipeline system of Texas Eastern Transmission Corp. which will distribute the gas to utilities serving wide areas from Ohio to Upper New York.

The following utilities are scheduled to receive the new supplies of gas delivered at Middletown. East Ohio Gas Co., a subsidiary of the Consolidated Natural Gas Co., serving Akron, Cleveland, Canton, Youngstown, and other Ohio cities; Manufacturers Light & Heat Co. and Ohio Fuel Gas Co., operating companies of Columbia Gas System, serving numerous cities in Ohio, West Virginia, and Pennsylvania. Manufacturers Light & Heat will use part of the new supplies to provide natural gas to the Consumers Gas Co. of Reading, Pa., Allentown - Bethlehem Gas Co. and Harrisburg Gas Co. Additional supplies will also go to the Philadelphia Gas Works Co. and the National Gas & Oil Corp. of Newark, Ohio.

The full capacity of the 800-mile Texas Gas line is approximately 400,000,000 cu. ft. a day. The pipe line, which went into preliminary operation as far as Louisville last December, has also begun supplying additional gas to existing customers along the route. These include the cities of Greenville and Shelby, Miss.; Memphis, Tenn.; Owensboro, Bowling Green, Franklin, and Madisonville, Ky., and Evansville, Vincennes, Bloomington, and Columbus, Ind.

Louisville, a new customer, is now receiving 20,000,000 cu. ft. of gas a day from Texas Gas. This quantity will be stepped up to 30,000,000 cu. ft. daily during the second year of the line's operation, and 40,000,000 cu. ft. daily thereafter.

Capacity in the line has also been reserved for Dyersburg and Union City, Tenn.; Madison and Lawrenceburg, Ind.; and Paducah, Ky.

Full operation of the 800-mile project will give Texas Gas a daily delivery capacity of over 600,000,000 cu. ft. a day throughout its entire system of 2,400 miles of line.

Pipe-Line Facilities Are Authorized in Virginia

Federal Power commission has authorized Virginia Gas Transmission Corp. and Roanoke Pipe Line Co. to construct pipe-line facilities which will carry natural gas to the Roanoke, Va., area for the first time.

Virginia Gas Transmission, Charleston, W. Va., will construct a metering and regulating station at a point on its main line near Gala, Va., and Roanoke Pipe Line Co., Roanoke, will build a 30-mile, 8-in. line extending from the Gala connection to Roanoke Gas Co.'s existing distribution facilities in Roanoke.

Estimated cost of the construction is $12,500 for Virginia Gas and $596,800 for Roanoke Pipe Line Co.

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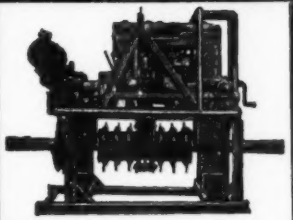

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Model K—16" to 26" Pipe Cleaning machine
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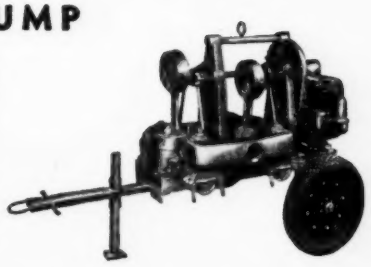

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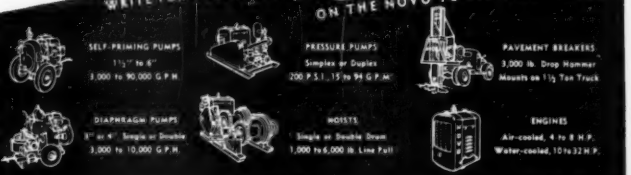

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Indicate the Subject by Number

1 **"Fractionating Absorbers in the Petroleum Industry"**

By: J. C. HANNAH, *Process Engineer*

Abstract: *Rapidly changing conditions necessitate familiarity with all methods now in use in the petroleum industry for separating mixtures of low boiling hydrocarbons and associated compounds in order to obtain the most economic method for a given gas recovery and or purification problem. This paper discusses one of these methods, i.e., fractionating absorbers. An example of application to actual plant data is shown.*

2 **"Pulsation Phenomena in Gas Compression Systems"**

By: I. C. BECHTOLD, *Director of Research and Development*

Abstract: *Pulsation phenomena in gas transmission lines leading to and from gas compressor stations are described along with a description of the mechanical vibration induced from the pulsative flow.*

3 **"Effect of Pulsation on Gas Measurement"**

By: C. F. YATES, *Research Engineer*

Abstract: *This paper discusses the effect of pulsative flow on the accuracy of measuring gas flow rate by orifice meters. Data are presented showing the relationship between magnitude and nature of the pulse and the resultant readings recorded by the measuring instrument.*

4 **"Simultaneous Determination of Hydrogen Sulfide and Carbon Dioxide in a Continuous Gas Stream"**

By: C. L. BLOHM, *Assistant Director of Research*, and F. C. RIESENFELD, *Research Chemist*

Abstract: *A method is described for the simultaneous determination of hydrogen sulfide and carbon dioxide in a continuous stream of natural gas. The two acidic gases are absorbed in standardized iodine and barium hydroxide solutions. Only simple laboratory equipment is required.*

5 **"Mechanical Vibration of Piping Induced by Gas-Pressure Pulsations"**

By: R. C. BAIRD, *Research Engineer*, and I. C. BECHTOLD, *Director of Research and Development*

Abstract: *The generation and nature of gas pressure pulses from reciprocating compressor action are described, together with the propagation of such pulses through pipe lines. The means whereby pulse energy is converted to mechanical vibration is discussed by the aid of analogous mechanical, acoustical, and electrical oscillatory systems. The economic importance of minimizing vibration in compressor and compressor dependent installations is indicated.*

6 **"A Critical Analysis of Methods of Determination of Water Dew Point in Hydrocarbon Gases"**

By: F. C. RIESENFELD, *Research Chemist*, and H. D. FRAZIER, *Research Chemical Engineer*

Abstract: *The authors have found that the values obtained from conventional dew point determination apparatus do not give true results when used on gases effluent from liquid dehydrators. A theoretical explanation for this phenomenon and a description of a method for determining the absolute water content of gases from this type of dehydrator is offered.*

7 **"Purification and Dehydration of Gases"**

By: C. L. BLOHM, *Assistant Director of Research*, and W. F. CHAPIN, *Process Engineer*

Abstract: *This paper covers the chemistry and chemical engineering of regenerative processes for removing hydrogen sulfide and carbon dioxide from gases by use of amine processes together with their simultaneous or subsequent dehydration. In addition there is presented a description of the engineering features and operation of the Glycol Amine plants which treat gas transported through the Texas California line.*

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REFINING

Sun Lets Contract for New Toledo Refinery Project

Sun Oil Co. has awarded contract to Catalytic Construction Co., Philadelphia, to double capacity of its catalytic polymerization unit at the Toledo refinery.

The existing equipment was constructed in 1940, and consists of 24 reactors with a reserve-structure area for the 24 cases to be added under the new contract. Existing cases and those to be installed are a type designed by Sun. The 48 cases will have a capacity of 5,000 bbl. per day of mixed butanes butylenes charge.

This added capacity will be required when the $20,000,000 refinery expansion program at the Toledo plant is completed this spring. Catalytic Construction Co. is also the contractor for this project, which features a quadruple reactor Houdriflow unit with a catalytic cracking capacity of 28,000 bbl. daily.

Work at Socony-Vacuum's Plant Nearing Completion

Modernization work at Socony-Vacuum Oil Co., Inc.'s East St. Louis refinery is nearing completion, according to Bechtel Corp., contractor. By the end of March final work will be done and units ready for operation.

The work consists of four major refinery units: a crude unit, thermal cracker, solutizer, and delayed coker, plus revisions to existing units and additions of necessary auxiliaries to permit operation of the new installations.

Current daily crude-oil charge capacity at the refinery is rated at 22,700 bbl.

Panhandle's New Catalytic Cracker to Operate Soon

Panhandle Producing & Refining Co.'s new $1,000,000 fluid catalytic cracking plant at Wichita Falls, Tex., is slated to go into operation soon.

The unit, constructed beside the original Panhandle refinery, is designed to handle 1,500 bbl. of charge stock daily. Gas oil produced in the old refinery will be utilized in the new plant, where it will be further broken down into fuel and other petroleum products. The catalytic process utilizes aluminum silicate catalyst.

The original Panhandle refinery was built in 1915, shortly after the company was founded. These instal-

NEARING COMPLETION.—Shown are two columns of Deep Rock Oil Corp.'s new catalytic cracking unit, which is being installed at the company's Cushing, Okla., refinery. The reactor unit was in final stages of installation atop the regenerator column when this photograph was made. Fractionating tower is at left. The complete cracking installation is expected to go on stream around May 15. Jones & Laughlin Supply Co., Tulsa, has contract.

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POWERS

lations will furnish all the gas oil run into the new unit, R. W. Jacobs, refinery superintendent, said. Formerly the gas oil was put into a thermal cracking unit.

Capacity of the older installation is rated at 5,000 bbl. daily of crude-oil distillation. Thermal cracking capacity is 1,500 bbl. daily; reforming capacity is 450 bbl. daily; and polymerization capacity, 150 bbl. production.

Universal Oil Products Co. designed the new cracking unit, and Jones & Laughlin Supply Co., Tulsa, handled engineering and construction.

Imperial Installing New Propane-Plant Facilities

SARNIA, Ont.—Equipment to cost several hundred thousand dollars is being installed at Imperial Oil, Ltd., refinery here for the production of liquid propane. The announcement was made by Dr. J. L. Huggett, plant superintendent.

The plant, expected to be completed by midsummer, is designed for an ultimate production of 800 bbl. daily, though initial production will be slightly under 300 bbl.

The new facilities will include two fractionating towers, condensers, reboilers, heat exchangers, and storage tanks specially designed to hold the liquid gas under pressure.

The product, never before produced at Sarnia, will be supplied in pressure cylinders for use as domestic heating and cooking fuel and for industrial purposes.

W.P.R.A. Completing Plans For 38th Annual Meeting

Plans are being completed for the thirty-eighth annual meeting of Western Petroleum Refiners Association, which is scheduled to be held in San Antonio March 27-29.

Among principal speakers who are slated to appear are Walter S. Hallanan, chairman of the National Petroleum Council and president of Plymouth Oil Co.; John L. McCaffrey, president, International Harvester Co.; and Henry J. Taylor, news commentator.

Refiners Pay $649,400,000 In Dividends, Report Shows

WASHINGTON.—Corporations engaged in oil refining paid out almost exactly $100,000,000 more in dividends in 1949 than in 1948, it was reported last week by the Department of Commerce.

The department noted that the publicly-reported cash dividend payments of all United States corporations, amounting to $6,495,800,000, were 7 per cent greater than 1948 dividends. The increase for the oil refining corporations was close to 20 per cent, but for the automobile industry it was better than 50 per cent.

Total dividend payments by refiners last year were listed by the department at $649,400,000, compared with $549,900,000 in 1948.

Plant Equipment Described

Construction and engineering details of special equipment used at the coal-hydrogenation demonstration plant of U. S. Bureau of Mines, Louisiana, Mo., where coal is converted into oil and gasoline, are described in a newly released publication, entitled "Special Equipment in the Coal Hydrogenation Demonstration Plant," Report of Investigations 4,584. Copies can be obtained free by writing Publications Distribution Section, U. S. Bureau of Mines, 4800 Forbes Street, Pittsburgh 13.

New Oil to Be Offered

Continental Oil Co., Ponca City, Okla., will offer to the public for the first time on February 15 a new "Conoco Super" motor oil, which the company says has undergone grueling tests, and took 8 years to develop. The new oil has had 2 years of summer and winter road testing, including a 50,000-mile road test in midsummer on the Mexican border.

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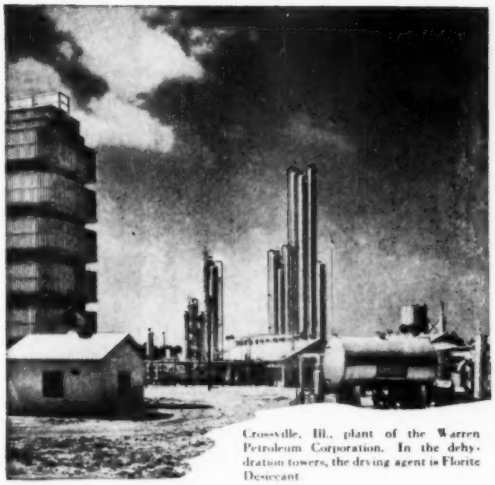

Crossville, Ill., plant of the Warren Petroleum Corporation. In the dehydration towers, the drying agent is Floritte Desiccant.

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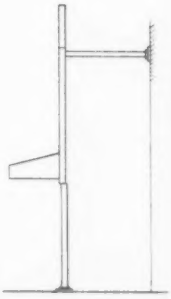

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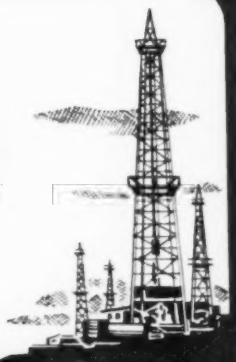

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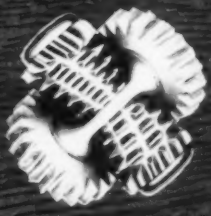

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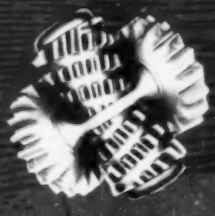

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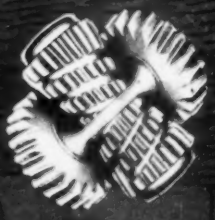

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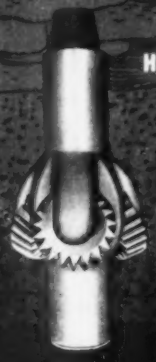

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Drilling Activity Not Down To Low Level of Year Ago

The number of rotary rigs operating in the United States and western Canada continued to decline during the week ended February 6 (latest report), but did not drop to the low point reached during the corresponding week of the previous year. It was at this time last year that drilling activity was at its lowest level for the year with only 1,931 rigs reported running as compared to the latest report with 1,948.

The latter figure represented a drop of 20 from the number running during the preceding week, and a decrease of 336 from the peak of 2,284 rigs running during the week ended December 12 when the present downward trend began. Decreases in active rigs during the latest week were reflected in all areas except the Pacific Coast and Western Canada.

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area	Week ended 2-6-50	Change week ended 1-30-50	Change week ended 2-7-49
Gulf Coast	491	— 5	— 76
W. Tex.-N. M.	685	— 3	+ 215
Ark.-N. La.-E. Tex.	130	— 6	— 30
Oklahoma	228	— 1	+ 30
Kansas	94	— 7	+ 1
Illinois-Eastern	56	— 5	— 36
Rocky Mountains	62	— 4	— 41
Pacific Coast	139	+ 7	— 47
Total U. S.	1,885	— 24	+ 16
Western Canada	63	+ 4	+ 1
Total	1,948	— 20	+ 17

*Courtesy Hughes Tool Co.

Shreveport Drillers Name Practice Study Committee

Phil Parker, Brewster Co., Shreveport; Jake Haas, Spot Drilling Co., same city; and R. M. Bass, Bass Drilling Co., Kilgore, Tex., comprise a special committee appointed by C. W. Glasscock, Glasscock Drilling Co. and chairman of the Shreveport chapter, American Association of Oilwell Drilling Contractors, to study rotary drilling practices and possible ways of improving them.

Earl Wakefield, Wichita, got the contract for a Wilcox sand wildcat to be drilled for Merrek Siler and associates in northern Grant County, Oklahoma. Location is just south of the Kansas line, about 6 miles southeast of Caldwell, and about 2 miles southeast of the recently opened Alton pool, where good production was found in the Simpson sand at 4,711-19 ft. Wakefield has an operating interest in the test.

Miracle and Fifer Form Drilling Firm at Casper

Walter Miracle, formely president of the Ideal Drilling Co., now dissolved, of Casper, Wyo., and R. M. Fifer, long associated with the National Supply Co. in the Rocky Mountain region, have organized the Miracle-Fifer Drilling Co. with headquarters at Casper. The new company has acquired the rigs and other equipment of the dissolved company.

Penrod Drilling Co. is nearing contract depth of 13,000 ft. in the Placid Oil Co. 1 Interstate Wholesale Grocers, Inc., wildcat, 42-20s-18e, Terrebonne Parish, Louisiana.

Marhenke Drilling Co., Augusta, Kans., is using cable tools on a wildcat test, 1 Rowe, it is drilling for C. A. Black and associates in 17-29-4e, in the Douglas pool area, Butler County, Kansas.

Dunlap & Graham, Inc., Long Beach, is the contractor on Northwest Syndicate and British American Oil Producing Co.'s latest test in the Northwest Raisin City area, Fresno County, California. The test, where drilling has just started, is 82 A-9 KRD, in 9-15s-17e.

Dorris Ballew, Inc., Natchez Miss., is drilling a northwest outpost test for the Bude field, Franklin County, Mississippi, for Southeastern Drilling Co. Location, in 19-5n-3e, is designated as 1-C USDA.

R. V. Dillard Drilling Co., Duncan, Okla., and Fleet Drilling & Producing Co., Ada, Okla., got the contracts for Seaboard Oil Co.'s latest two wells to be drilled in the South Palacine pool, Stephens County, Oklahoma. These wells will be 1-A and 4 Clinton-Muncreif, the former in 27-2s-6w, and the other in 21.

Fleet Drilling & Producing Co., Ada, Okla., and Dallas, has contracted with Sohio Petroleum Co. to drill a projected 6,500-ft. exploratory test a mile south of the Cose field, Cooke County, North Texas. The test, 1 Pringey-Scanlon, is located in Block 81, Robert Finney Survey.

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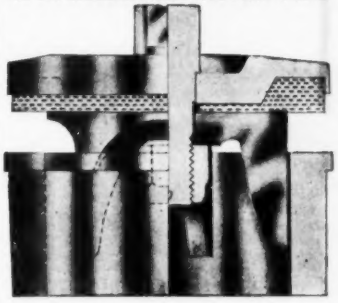

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The newly organized B B M Drilling Co., Houston, is beginning operations with four rotary rigs, three of which are power-operated and one steam-operated. Each is capable of drilling to 15,000 ft. Three were acquired from Barnsdall Oil Co., together with toolpushers and all crews, who have been in continuous service on these rigs for the past several years.

P. F. BARNHART

FRANK WHITLEY

Personnel. — Officers include Paul F. Barnhart, Houston, president; and Frank Whitley, Houston, and David G. Baird, New York, vice presidents. Barnhart previously was associated with Frank and George Frankel, Houston, independent producers, as manager of operations in Texas, Mississippi and Arkansas. Earlier, he had been with Barnsdall Oil Co. as engineer and assistant production superintendent in the Gulf Coast and South Texas districts.

Whitley, who is general manager as well as vice president, previously was assistant to the vice president and manager of operations for J. S. Abercrombie Co., Houston. He had been with that organization since 1933.

V. V. Thomasson is drilling superintendent with headquarters at Snyder, Scurry County, Texas, where the company's West Texas offices are located. He came to the company from Barnsdall Oil Co., previously, he had been employed in turn by Noble Drilling Co. and Olson Drilling Co.

Toolpushers are: Jake B. Waltermire, previously with Barnsdall, and before that with Glassell Drilling Co. and Parker Drilling Co.; and A. P. Hegenheiser, also previously with Barnsdall, and before that with H. L. Hunt and Grady Vaughn. Each has had more than 20 years of experience as a toolpusher.

Operations. — Currently, the company has operations in western Oklahoma, West Texas, and in the Old Ocean field, on the Texas Gulf Coast.

Carl B. King Drilling Co., Midland, Tex., has contracted for a 13,000-ft. wildcat test to be drilled for Spartan Drilling Co. and Lohman & Gardner in northwestern Martin County, West Texas. Location is for 1 Walcott, in League 251, Ward CSL Survey.

Kemp Drilling Co., Shreveport, is moving in rig to location to drill the Ryan Oil Co. 1 J. E. Maxwell, SE NE 14-12n-2e, in the Pickens area of Yazoo County, Mississippi. The well is projected to approximately 8,500 ft. to test the Travis Peak horizon.

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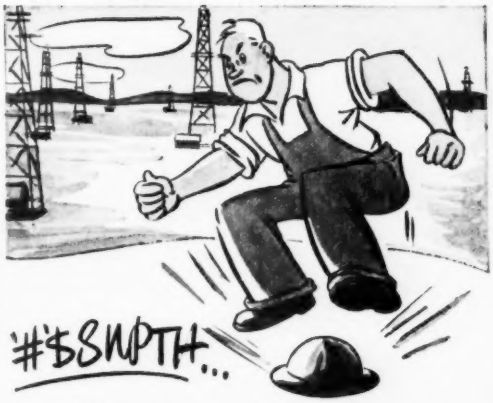

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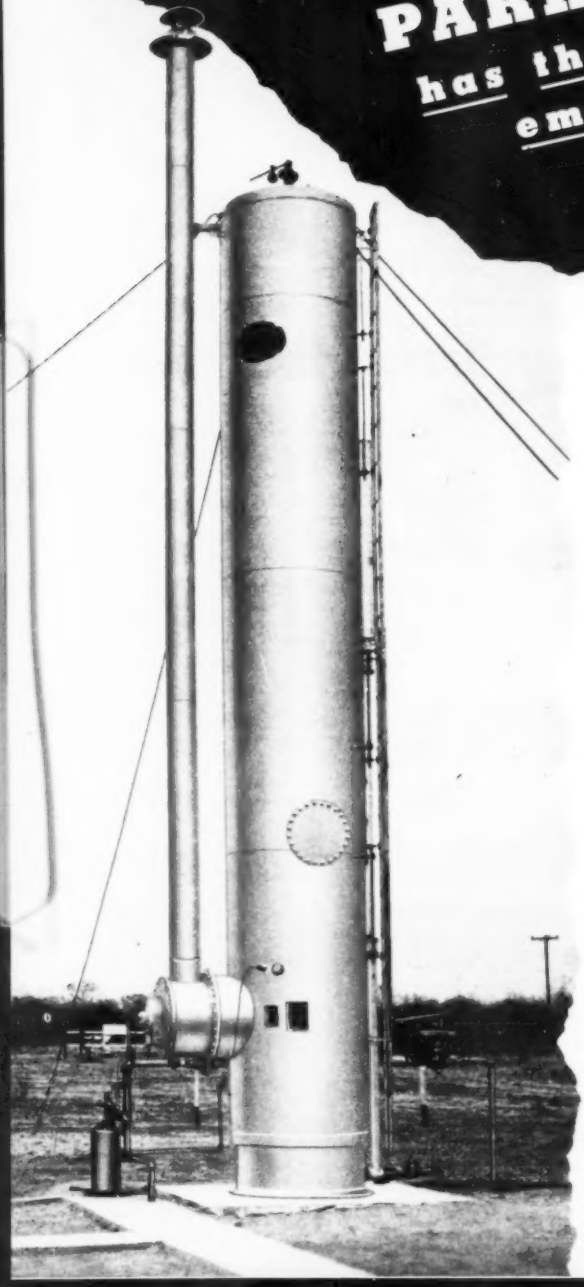

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Mississippi Gets Travis Peak Oil

MISSISSIPPI prospects are beginning to look brighter and luck seems to be turning for the wildcatters. Travis Peak (or Hosston for those geologists who insist the Texas Travis Peak is not the equivalent of the so-called Travis Peak of Louisiana, Arkansas, and Mississippi) oil has been found on the north edge of Pickens field, in Yazoo County.

Carter Oil Co. 1 Wilson, in 30-12n-3e, about a half mile north of the shallow production limits of Pickens field, is flowing about 200 bbl. per day of 42°-gravity oil, from perforations taking in about the top 2 ft. of a sand in the Travis Peak (Hosston) at 7,730-7,732 ft.

Geologically, this production coming from the base of the Lower Cretaceous is very deep and a long distance from any production as low in the geologic column. To the west, the nearest Hosston production is probably in Urbana and Sandy Bend fields in Union County, Arkansas, in 18s-13w; and the one-well gas field of Downsville in Union Parish, Louisiana, in 10-19n-1e. These are probably around 125 miles west of Pickens. To the southeast around 100 miles, in Jones County, Mississippi, in 6n-11w, there has been some production in West Ovett field from the lower Glen Rose at around 12,000 ft. Despite the depth, this is still a little higher in the geologic column than the Hosston.

Carter's test was carried all the way through the Smackover and into salt, to a total depth of 12,252 ft., but found nothing below the Hosston that looked like a commercial well. From an elevation of 240 ft., the following tops are reported: Wilcox 1,291 ft.; Midway, 3,134 ft.; Clayton 3,905 ft.; Selma 3,950 ft.; Eutaw 4,806 ft.; Tuscaloosa 5,583 ft.; Glen Rose 6,254 ft.; Hosston (Travis Peak?) 7,765 ft.; Cotton Valley 9,350 ft.; Buckner 11,160 ft.; Smackover 11,210 ft.; Salt (Louann?-Eagle Mills) 12,219 ft.

Side-wall cores had favorable shows at various intervals: 7,510-46 ft.; 7,640-90 ft.; 7,730-66 ft.; 7,818-27 ft.; 7,865-80 ft. Side-wall cores in the Cotton Valley section had minor shows at 10,696 and 10,840 ft.

Permeability tests and porosity determinations were made on cores from the Hosston (Travis Peak) sands and showed permeabilities up to 686 md. and porosities ranging from 12.2 to 22.4 per cent. The Cotton Valley section showed plenty of sand, but generally it was tight and hard.

The present production is coming from perforations at 7,728-32 ft., of which the top 2 ft. are figured to be above the top of the sand. Although on basis of drill-stem test the water level may be below 7,750 ft., Carter is planning to perforate cautiously and will probably take in about 5 ft. more pay with perforations and complete the well.

Reports from Mississippi are that Carter has announced a location for another test in NW SE 22-12n-2e, which would be about 3 miles northwest of the discovery well. Speculation among other company geologists is to effect that the local play is based on the assumption that the Hosston oil accumulation is controlled by the main faults along the north side of Pickens field, which run in a general northwest-southeast direction.

While Pickens field is bady faulted, still in general there is considered to be a major faulting along the north side in this northwest-southeast direction, with the upthrow side to the south. The general dip of the fault plane is believed to be to the north or northeast. The Carter discovery is believed to be still on the upthrow side of the fault in the Hosston.

Several years ago a deep test to the Smackover was drilled in Tinsley field about 25 miles southwest of Pickens. This well picked up Smackover at around 11,625 ft. It failed to find commercial production, but some geologists feel this was due to some complicated faulting conditions.

If the Carter discovery holds up, and the sand body does not turn out to be a small lens, there will be more testing of the Lower Cretaceous and possibly of the Smackover. However, it is reported that the Smackover section cut in the Carter test differed considerably from the areas where the Reynolds zone of oolitic pay is well developed. Apparently there is a considerable change in the sedimentary facies of Smackover deposition this far east of production. On the other hand, this may be drawing too firm a conclusion from the small amount of evidence available.

Charles J. Deegan.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

TEXAS GULF COAST.—Lower Wilcox production was opened on the southwest flank of the old Clay Creek dome, Washington County, when Alaska Steamship Co. and Newman Bros. Drilling Co. et al., 1 Ida Rosenbaum flowed 184 bbl. of 43.1°-gravity oil per day through perforations at 5,009-10 ft. In South Cabeza Creek field, Goliad County, Continental Oil Co. found Cook Mountain production in the 1 Adrian Flores, at 5,286-94 ft.

WEST TEXAS.—Field sources credited Chapman & McFarlin 3 Cogdell, north stepout to the Kent County discovery, with topping the Canyon lime at 6,710 ft., minus 4,341 ft. and 25 ft. high to the discovery.

SOUTHEAST NEW MEXICO.—Plains Production 1 Scarbrough, 2 miles south of Dublin field, prepared to complete after flowing 375 bbl. of oil a day through open tubing, naturally, from the Queen sand.

ROCKY MOUNTAIN AREA.—Oil was recovered on drill-stem test at Earl Evans' Red Willow County, Nebraska, rank wildcat. The operator has run casing for further test. Two additional gas wells are being completed by Ohio Oil Co. in the Huntsman area, Cheyenne County, Nebraska.

ARKANSAS.—In the southwest corner of Union County, C. H. Murphy 1 Gregory prepared to complete as a dual producer from the Cotton Valley and Smackover formations.

PERMIAN BASIN

Pennsylvanian Pay Added To Shafter Lake Field

MIDLAND—Sinclair Oil & Gas Co. 12-154 University, 765 ft. from north and 555 ft. from east lines, northwest quarter 24-13-University Lands Survey, added Pennsylvanian pay to Shafter Lake field of Andrews County.

The well was drilled to 11,945 ft., 45 ft. into the Ellenburger, then plugged back to 10,488 ft. On elevation of 3,247 ft., top of the Pennsylvanian was 8,470 ft., with top of pay at 8,500 ft. Initial potential was 104.2 bbl. of 38°-gravity oil a day through tubing run to 8,416 ft. Gas-oil ratio was 233 cu. ft., and flowing pressures were 25 psi. on tubing and 700 psi. on casing.

In West Parker field of Andrews County, Humble Oil & Refining Co. 39 J. E. Parker, Account 8, SW SW 1-A54-PSL, completed for 28.5 bbl. of 34.5°-gravity oil a day, as the first well to produce from the Wichita Albany section of the Permian. Total depth was 9,144 ft., plugged back to 7,170 ft. On elevation of 3,348 ft., top of the Wichita was 6,880 ft., and top of pay was 6,940 ft.

In Upton County, Humble 1 Mrs. Z. Oswalt, 2,640 ft. from south and 660 ft. from east lines, 12-B-CCSD&RGNG, northwest of Benedum production and 3½ miles southwest of the 1 Pembrook (see wildcat completions), completed dry at plugged-back depth of 7,637 ft., after showing gas from several sections.

First shows of oil and gas were reported in the Pennsylvanian around 6,820-98 ft. At 10,260-335 ft. gas gaged 42,000 cu. ft. daily, and at 11,520-585 ft. the well flowed gas at the rate of 362,000 cu. ft. daily, on the basis of an 8-hour test through ½-in. choke. There were no results after plugging back to 7,637 ft.

In Crockett County, approximately 1 mile southwest of Cities Service Oil Co. 1-C Owens, Wolfcamp extension completed this week, Humble 1-B Cox, 39-GG-HE&WT Survey, reported salty, sulfur water on a drill-stem test of the Ellenburger from 7,350-7,410 ft. Recovery was 60 ft. of drilling mud and water, and 1,425 ft. of salty, sulfur water, with no shows. Operators planned to plug back to around 6,400 ft. to test the Wolfcamp, which logged some signs of oil and gas in drilling. Top on the Ellenburger had not been released.

In central Crockett County, Humble 1-A Alma Cox, 4 miles southwest of Ozona in 3-QR-GC&SF Survey, was drilling below 7,895 ft. in Ellenburger dolomite. Top of the formation had not been reported. A drill-stem test from 7,807-55 ft., open 26 minutes, recovered 20 ft. of drilling mud, with no shows.

Chapman & McFarlin 3 Cogdell, ½ mile north of the discovery in Kent County, was said to have topped the Canyon lime at 6,710 ft., or minus 4,341 ft., which checked some 25 ft. high to the discovery well, according to some observers. It was drilled ahead to 6,768 ft. and a 1-hour drill-stem test from 6,710-68 ft. had gas in 30 minutes, and recovered 630 ft. of heavily oil and gas-cut drilling mud. There was no free oil nor water reported. Official information on the well had not been released.

Drilling & Exploration Co., Inc. 1 Wilson Connell, NE NE 19-5-H&GN, 2 miles southeast of Polar, was swabbing after plugging back to 2,349 ft., from total depth of 7,931 ft. Before plugging back, the well had filled with 16 bbl. of oil, and some water, after swabbing down and standing overnight.

Stekoll Petroleum Co., Dallas, has staked location for an Ellenburger wildcat in northwest King County, as the 1 D. E. Richards, SW SE Section 11, BS&F Survey, and 12 miles north of Guthrie. The proposed 6,000-ft. test is located 14 miles west of Ard. Drilling Co. 2 Masterson in Section 52, S. P. Knott Survey, which was last reported as pumping 95 bbl. of oil, with a small amount of water, in 18 hours, from sand topped at 4,419 ft.

First report and completion on Ard 1 R. B. Masterson, 51-F. P. Knott Survey, 15 miles northeast of Guthrie, had total depth at 4,439 ft. It was completed dry in December 1949.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCAT

Crockett County, discovery or 1½-mi. SW extension to Wolfcamp production: Cities Service Oil Co. 1-C Owens, 410 ft. from S, 810 ft. from E lines, 18-GG-TCRR, 9 mi. NE Sheffield, TD 7,714 ft., PB 6,002 ft., elev. 2,736 ft., Wolfcamp 5,710 ft., perforated 668 shots 5,825-5,992 ft., IP 37 bbl. distillate and 35,000,000 cu. ft. of gas daily.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Ector County: DeKalb Agricultural Association 1 Paul Slator, 14-45-T1S-T&P, 1½ mi. NW West Goldsmith, dry, TD 5,982 ft., elev. 3,260 ft., San Andres 4,245 ft., Clear Fork 5,719 ft.

Garza County: Morris Davis 1 G. D. Ellis, Sec. 1,302 ft., J Hayes Sur., 8 mi. NW Post, dry, TD 3,600 ft., elev. 2,687 ft., San Andres 2,610 ft.

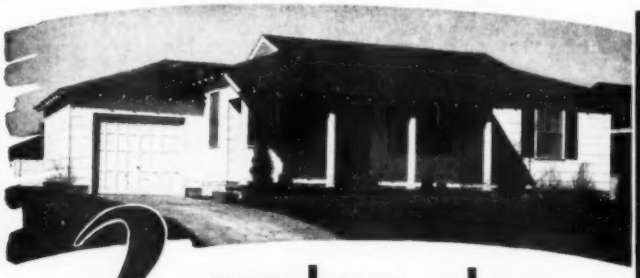
Kent County: Ryan, Hayes & Burke 1 Faustina Kenny, SW SE 57-2-H&GN, NW corner of county, dry, TD 7,509 ft., elev. 2,324 ft., San Angelo 2,440 ft., Sedwick 4,940 ft., reef 6,484 ft.

Runnels County: Jake Freedman 1 A. C. Ernst, CTRR Sur. 73, 2½ mi. S North Winters field, dry, TD 4,953 ft., elev. 1,914 ft.

Sells Petroleum Co. 1 Stubblefield, A. E. Evans Sur. 274, 4 mi. NW Newton, 9 mi. S Humble 1 Odom, dry, TD 3,245 ft., elev. 1,819 ft., Saddle Creek 2,675 ft., Flippen 2,700 ft., Gunsight 3,100 ft., Swastiga 3,234 ft., Ellenburger 5,156 ft.

George W. Strake 1 E. M. Cathey, J. Early Sur. 449, 1½ mi. W Wingate, dry.

(Continued on page 170)



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EASTERN TEXAS

Confirmation Well Coring Woodbine Section

DALLAS.—Hollingsworth Oil Co. 1 Four States Oil Co., confirmation well to the Earl Lee well in Wood County, was testing and coring the Woodbine section. Fourteen feet of saturated oil sand was recovered from 5,405-19 ft., and additional oil sand on subsequent cores from 5,419-37 and 5,437-55 ft. At last report the well was to continue coring to the water table.

Eight miles northwest of Hallsville in Harison County, Atlantic Refining Co. 1 F. L. Landers Unit, E. A. Merchant Survey, was drilling below 6,950 ft. The attempted confirmation test of the North Lansing gas-distillate field had no commercial shows in the Young zone of the Rodessa and was drilling ahead to the Pettit. The discovery, Atlantic 1 Isom, produced gas distillate from the Young zone at 6,734-93 ft.

Bobby Manziel 1 John L. Campbell, step-out test 1½ miles east of Tyler Paluxy field, in the R. Fletcher Survey, Smith County, had surface pipe set and was drilling around 2,000 ft. at last report.

In Red River County, J. T. Sands 1 Clara B. Evans, William Becknell Survey, 1 mile south of Bagwell, was running casing to test. Total depth was 1,825 ft. Location is 750 ft. southeast of Frank Stratton 1 Evans, same survey, which had some oil in the Paluxy, but which was never reported as a completion.

Delta Drilling Co. 1 Mrs. Minnie Russell, Travis Peak test 1 mile south of Blackfoot in Anderson County, reported sample tops on the upper Glen Rose lime at 7,650-60 ft., an anhydrite zone from 8,930-40 ft., and the Massive anhydrite at 9,280-90 ft. Operators cored from 9,570-9,620 ft., then started drilling and were below 9,764 ft. Core recovery was not disclosed.

Humble Oil & Refining Co. 1 Mrs. Ruth Frank, 3½ miles south of Douglass in Nacogdoches County, cored siltstone from 8,680-95 ft., and black shale from 8,695-8,731 and 8,731-34 ft. Operators prepared to core ahead from 8,737 ft., total depth.

Three miles east of Bazette in Navarro County, Nelson & Edward Morris 1 Bain, Richard D. Newman Survey, A-620, flowed some oil after being shut in for a week. Tubing pressure was 900 psi. at the start, which soon died. Operators swabbed perforations from 3,301-04 ft., recovering an estimated 20 bbl. of 39°-gravity oil in 6 hours, then started recovering heavy mud and some salt water. The water was believed to be coming from Woodbine perforations at 3,369-72 ft., which were to be squeezed.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) WILDCAT FAILURES

Anderson County: J. L. Duffy 1 Southern Pine, H. Main Sur., 7 mi. SE Palestine, dry, TD 547 ft. in salt water.

Denton County: H. B. Mummert, Jr., 1 J. H. Champion, Solomon Yoachum Sur., A-1440, 3½ mi. SE Bolivar, dry, TD 2,207 ft.

W. W. Wise 1 L. T. Kerby, H. Tierwester Sur., A-124, ¼ mi. SE Sanger, dry, TD 3,126 ft.

W. W. Wise 1 J. S. Sinclair, Henry Tierwester Sur., A-1241, 1¼ mi. SW Sanger, dry, TD 1,824 ft.

Red River County: Buzbee Lumber Co. 1 Sam Buzbee, NW corner Benjamin Gooch Sur., ½ mi. SW Bagwell and 3,000 ft. E Stratton 1 Allen; dry, TD 1,822 ft., elev. 500 ft., Woodbine 960 ft. by samples, logged Paluxy stringer 1,812 ft., swabbed and pumped some oil from 1,815-22 ft.

Wood County: Humble Oil & Refining Co. 1 H. Watts, F. Holland & J. Colson Sur., 4½ mi. NW Mineola, dry, TD 8,176 ft., elev. 388 ft., Pecan 2,860 ft., Austin 4,285-4,588 ft. by samples, was temporarily abandoned at 4,741 ft. in November 1949.

F. R. Jackson 1 C. W. Foucke Estate, G. B. Watkins Sur., 1 mi. S Pine Mills field, 900 ft. NE Hollandsworth 1 Schenewerk; dry, TD 5,762 ft., elev. 498 ft., sub-Clarksville 4,960 ft. by samples, had cored 1½ ft. oil sand, tool plugged on attempted drill-stem test.

LA.-ARK.

Union County Discovery To Be Dually Completed

SHREVEPORT.—C. H. Murphy 1 W. K. Gregory, SE SW 28-19s-18w, wildcat discovery 5 miles southwest of Tubal in Union County, has aroused more interest among Arkansas oil operators than any well since the Schuler discovery some 13 years ago, according to field reports.

The new discovery, which has produced oil from the Cotton Valley and the Smackover formations, was to be dually completed.

A drill-stem test of the Cotton Valley at 8,012-22 ft. flowed oil at the rate of 150 bbl. a day through ¼-in. choke, under tubing pressure of 150 psi. A second test produced 139 bbl. of 43°-gravity oil in 15 hours through ¼-in. choke, under tubing pressure of 300 psi., and with gas-oil ratio of 700 cu. ft.

A 6-hour drill-stem test of the Smackover at 9,278-88 ft., using ¼ and ⅛-in. bottom and top chokes, flowed at the rate of 204 bbl. of 47°-gravity oil a day, under tubing pressure of 2,100 psi.

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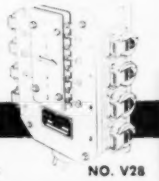

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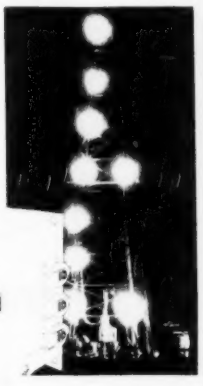

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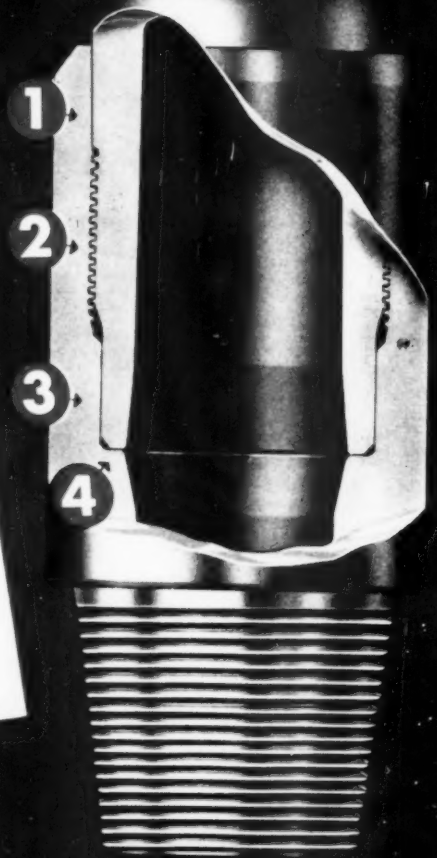

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ton field of Lafayette County is from around 9,312 ft.

In Claiborne Parish, Gulf Refining Co. 1 M. M. Kinnebrew, 26-20n-7w, was running electrical surveys. Total depth was 10,925 ft., in the Cotton Valley.

Completion was reported on Ohio Oil Co. and Gulf Refining Co. 1 O. L. Martin, 3-22n-7w, Claiborne Parish. The wildcat was drilled to 11,757 ft., in salt, then plugged back to 9,136 ft., in the Cotton Valley, from which it completed, flowing 40 bbl. of 42°-gravity oil a day through ¼-in. chokes, from perforations at 8,852-8,902 and 9,025-80 ft. Flowing pressures were 150 psi. on tubing and 725 psi. on casing. Gas-oil ratio was around 7,000 cu. ft.

NORTH LOUISIANA WILDCAT FAILURE

Richland Parish: C. M. Bagley 1 Earl Hill, NW SW NW 21-16n-7e, dry, TD 3,050 ft., elev. 79 ft., Cane River 995 ft., Midway 2,046 ft., Clayton 2,575 ft., Tuscaloosa 2,544 ft., sand 2,544-2,607 ft., upper Glen Rose 2,953 ft.

ARKANSAS WILDCAT FAILURES

Columbia County: William Hamm, Jr., 1 C. E. Davis, SW NW 5-16s-21w, dry, TD 7,100 ft., elev. 335 ft., Tokio 2,638 ft., Massive anhydrite 3,125-3,258 ft., James 3,793-3,826 ft., Travis Peak 4,120 ft., Cotton Valley 5,200 ft., Buckner 6,795 ft., Smackover 7,075 ft., porosity at 7,078 ft. had salt water.

Ouachita County: Lyons & Prentiss 2 Lester Realty Corp., SE SE NW 31-14s-19w, dry, TD 2,905 ft.

Union County: Spartan Drilling Co. 1 Claude Everett, SE SE NW 36-17s-15w, dry, TD 4,503 ft., elev. 243 ft., James 3,028-60 ft.

SOUTHWEST TEXAS

New Gas Discovery For Dimmit County

CORPUS CHRISTI. A new gas discovery for Dimmit County is the Continental Oil Co. 2 McKnight, R. S. Riddle Survey 9, 950 ft. southwest of the 1 well which was completed as an oil discovery for the new Wintergarden field. The hole was drilled to a depth of 3,310 ft. and 6-in. production casing was set on bottom. Operators perforated 2,804-11 ft. in the Olmos 5-A sand, and the well flowed 5,100,000 cu. ft. of gas per day on open flow, with shut-in pressure on the tubing at 1,227 psi.

Brooks County gained a new gas-condensate field with completion of the J. R. Frankel A-1 J. L. Cage, wildcat 10 miles southwest of Falfurrias. The well flowed 96 bbl. of 54°-gravity distillate, plus 3,860,000 cu. ft. of gas per day, with shut-in pressure at 2,600 psi. on the tubing and 2,650 psi. on the casing. On open flow, the well flowed 34,000,000 cu. ft. of gas daily. The well was drilled to a depth of 7,804-09 ft. and production is through perforations at 7,804-09 ft. The new discovery is in the Tex-Mex RR Survey 711.

Humble Oil & Refining Co. is testing gas through perforations at 2,918-28 ft. in the 10 H. Roos, wildcat venture in Labbe field of Duval County. Operators have set 5½-in. production string at 2,948 ft. The prospective discovery is located in the BS&F Survey 119, 13.5 miles northeast of Freer.

A good show of oil around 580 ft. has been tested in the Chemical Attraction Oil Co. 1 C. J. Zwanzig, wildcat test ½ mile northeast of Medina in Bandera County. The hole has been drilled to a depth of 650 ft. and is now waiting for larger rig to drill deeper.

The 41 new locations include 10 wildcat starts, 1 each in Milam, McMullen, Jim Hogg, Jim Wells, Nueces, and San Patricio counties and 2 each in Bastrop and Guadalupe counties. There was 1 successful exploratory test completed in Brooks County, while 11 were dry, 1 each in Atascosa, LaSalle, Travis, Uvalde, and Williamson counties, 2 in Bexar, and 4 in Duval County.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCAT

Brooks County: Gas discovery—J. R. Frankel A-1 J. L. Cage, Tex-Mex RR Sur. 711, 10 mi. SW of Falfurrias, TD 8,005 ft., perf. 7,804-09 ft., IP: 34,000,000 cu. ft. of gas on open flow, SITP 2,600 psi., SICP 2,650 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: Ray Clark 1 T. C. Tuerpe, I&GN Sur. 188, A-111, 4 mi. NW of Rossville, dry, TD 2,846 ft.

Bexar County: J. C. McCabe 1 Cora Dillon, Manuel de Luna Grant, A-8, 17 mi. SE of San Antonio, dry, TD 3,299 ft.

Precision Prospecting Corp. of San Antonio 1 Ernst Eastwood, 1½ mi. NW of Summerset, S. L. Wheeler Sur. 130, A-792, dry, TD 1,535 ft.

Duval County: Argo Oil Corp. 1 D. C. Chapa, AB&M Sur. 173, 20 mi. W of Benavides, 1½ mi. NE of Pantex field, dry, TD 4,911 ft.

H. J. Porter 1 Garcia, San Diego de Arriba Sur., A-212, 11 mi. N of San Diego, dry, TD 5,250 ft.

The Texas Co. 1 Duval County Ranch O/A NCT-4, Quirino Gonzales Sur. 588, A-1,726, 2 mi. S of Cedro Hills field, dry, TD 4,302 ft.

The Texas Co. 2 Duval County Ranch O/A NCT-1, GC&SF RR Sur. 253, 7½ mi. SW of Freer, dry, TD 2,805 ft.

LaSalle County: Henderson Coquat and Amerada Petroleum Corp. 1 St. Louis Union Trust Co., BS&FRR Sur., A-100, 22 mi. E of Encinal, dry, TD 6,539 ft.

Travis County: E. R. Marts 1 Henry Allen.

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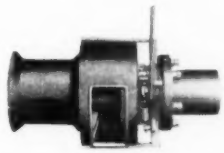

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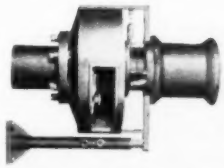

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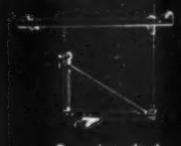
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Williamson County: Hanson & Swenson et al 1 Joe Nelson, Robert Bissett Sur., 5 mi. E of Copeland, dry, TD 440 ft.

TEXAS GULF COAST

Clay Creek Dome Test Gets 184-Bbl. Flow

HOUSTON—Potential gage on the Alaska Steamship Co. & Newman Bros. Drilling Co. et al, lower Wilcox sand discovery on the southwest flank of the Clay Creek dome, Washington County, reported a flow of 184 bbl. of 43°-gravity oil per day through a 5 32-in. choke. Hole is bottomed at 5,012 ft. with 5½-in. casing set on bottom for completion. Production is through perforations at 5,009-10 ft. Well is located in the Nestor Clay Survey, Abstract 29.

Brazos Oil & Gas Co. has completed the 2 State of Texas 33724 for a new pay discovery in Powderhorn Lake field of Calhoun County. The well was drilled to a depth of 6,000 ft. and 5½-in. casing was set at 5,445 ft. Casing was perforated in the fifth sand of the Miocene age from 7,175-200 ft. and the well flowed 146 bbl. of 29.5°-gravity oil daily with 1,700 psi. tubing pressure.

New pay has been opened in South Cabeza Creek field, Goliad County, with completion of the Continental Oil Co. 1 Adrian Flores. Through perforations at 5,286-94 ft. in the Cook Mountain section, the well flowed 57 bbl. of 46.9°-gravity oil per day on gas lift. The well was drilled to a depth of 5,330 ft. and plugged back to 5,299 ft. for completion.

Houston Oil Co. of Texas and American Republics Corp. are preparing to run potential on the 1 E. P. Libscomb et al, wildcat discovery well 3 miles northeast of Mauriceville in Orange County. The well is bottomed at 8,310 ft. and is flowing through perforations at 7,650-60 ft. A section of some 90 to 100 ft. of gas-distillate sand is reported for the discovery. Location of the well is in the Josiah Brick Survey, Abstract 48.

The 47 new locations include 10 wildcat starts, 1 each in Chambers, Hardin, Jefferson, Liberty, Waller, Bee, Karnes, and Lavaca counties, and 2 in Wharton County. There were two successful exploratory wells completed, one each in Jefferson and Washington counties, while four were dry, one each in Brazoria and Montgomery counties and two in Jefferson County.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Liberty County: New pay at South Liberty—Cities Production Corp. E-8 Nonie O'Brien, M. G. White Sur., dual completion, TD 7,145 ft., top pay 6,626 ft., Yegua, perf. 6,626-702 ft. (new sand), IP: 257 bbl. oil per day, 12 64-in. choke, GOR 926, TP 925 psi., 35.1° grav., top pay 6,560 ft. (new sand, Yegua), perf. 6,566-600 ft., IP: 128 bbl., 12 64-in. choke, GOR 873, CP 350 psi., 36.6° grav.

Washington County: New pay at Clay Creek—Alaska Steamship Co. et al 1 Ida Rosenbaum, Nestor Clay Sur., A029, 12 mi. N of Brenham, TD 5,012 ft., top pay 5,005 ft., (lower Wilcox) perf. 5,009-10 ft., IP: 183 bbl. oil per day, 5 32-in. choke, GOR 405, TP 800 psi., 43.1° grav.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Brazoria County: Freeport Sulphur Co. A-8 Freeport Sulphur Co., Bryan Mound, C. Areola Sur., A-142, 3½ mi. SW of Freeport, dry, TD 4,608 ft.

Jefferson County: Hunt Oil Co. 3 Dishman-Lucas, Wm. McFarland Sur., A-39, 4 mi. SE of Nome, dry, TD 7,272 ft.

Sun Oil Co. 2 Texas Public Service, John

W. Kirby Sur., A-586, 3 mi. SE of Nome townsite, dry, TD 6,555 ft.

Montgomery County: Dale W. Moore and Morris K. Womack 1 W. S. Wysinger et ux, James I. Foster Sur., 8 mi. W of Willis, dry, TD 7,063 ft.

OKLAHOMA

Happy Hill Outpost Gets Show in Oswego

DAVON OIL CO. has a show of oil from the Oswego lime at an outpost about ½ mile east of Happy Hill pool, recently opened in the Bartlesville. Davon Oil Co. 1 Jordan, SW SW NW 9-13n-3e, Lincoln County, was drilled to a total depth of 4,725 ft. in the Bartlesville with casing set at 4,260 ft. Since the well missed the pay in the Bartlesville, casing was perforated at 4,156-94 ft. opposite the Oswego and tested a good show of gas with a fillup of 350 ft. of mud with a show of oil. Well was treated with 1,000 gal. of acid after which it had a good showing of gas with a heavy spray of oil. Operator is installing tanks for further testing.

Shell Oil Co. has completed its 1-mile westward extension of Elk City field. Shell 1 Ada Smith, C NE SW 7-10n-21w, Beckham County, was completed flowing 648 bbl. of 49.4°-gravity oil with 39 bbl. of drilling water and 1,469,000 cu. ft. of gas through 22/64-in. choke from perforations at 10,185-208 ft. and 10,220-94 ft. opposite the Hoxbar conglomerate. Crew is rigging up at another stepout about a mile further west at Shell 1 Oklahoma-F, C SE SW 12-10n-22w. On the east side of the field, Wilcox Oil Co. 1 Walter, C SW NW 19-10n-20w, Washita County, flowed 220 bbl. of condensate and 2,000,000 cu. ft. of gas through 12/64-in. choke from pay at 8,854-60 ft.

Sohio Petroleum Co. has completed its Deese sand discovery north of Marietta in Love County. Sohio 1 Tims, NE NE NW 32-6s-2e, flowed 117 bbl. of 42°-gravity oil through 15/32-in. choke from pay intervals at 6,285-6,305 ft., 6,470-6,505 ft., and 6,5555-65 ft. Total depth is 7,147 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Carter County: New pay in SW Lone Grove George Blaylock 1 Duke, SW NE NW 5-5s-1w, 60 bbl. from Oil Creek at 4,638-77 ft., TD.

Okfuskee County: Mason field (reopened)—F. A. Gillespie & Son 1 Merideth, NE NE NE 10-12n-9e, 40 bbl. from Gilcrease at 3,294-3,302 ft., TD.

OKLAHOMA WILDCAT FAILURES

Bryan County: Hayes Robertson 1 Hauk heirs, NE NW NW 1-8s-11e, dry, TD 2,395 ft.

Creek County: W. H. Martgan 1 Wilson, NE NE NE 8-17n-9e, dry, TD 2,569 ft., Hogshooter 953 ft., Layton 1,019 ft., Checkerboard 1,344 ft., Cleveland 1,370 ft., Oswego 1,953 ft., Prue 2,036 ft., Verdigris 2,129 ft., Inola 2,522 ft., Bartlesville 2,530 ft.

Jefferson County: Farris Oil and Loffland Bros. 1 Harris, SE SE NE 17-6s-8w, dry, TD 2,050 ft., sand 908 ft., 1,322 ft., and 1,390 ft., fusilinid lime 1,633 ft.

Kiowa County: J. C. Tunstill 1 Tilly Adams, NW SW NW 6-6n-15w, dry, TD 1,300 ft. Benson & Montin 1 Newberry, SW SW NW 16-7n-20w, dry, TD 1,142 ft.

Murray County: C. E. Skiles 1 Biggerstaff, NE NW NE 32-1s-3e, dry, TD 3,500 ft.

Okfuskee County: W. A. Delaney, Jr., 1 Anderson, NW NW SE 11-12n-9e, dry, TD 3,405 ft.

Payne County: Coronado Oil Co. 1 Foster, NE SE NW 26-18n-6e, dry, TD 3,255 ft., Hogshotter 1,732 ft., Layton 1,795 ft., Checkerboard 2,089 ft., Cleveland 2,109 ft., Bartlesville lime 3,560 ft., Oswego 2,600 ft., Cherokee 2,644 ft., Prue 2,677 ft., Verdigris 2,738 ft., no Red Fork, no Bartlesville, Burgess 3,212 ft., Mississippian 3,237 ft.

MISSISSIPPI

Carter Still Testing Yazoo County Discovery

JACKSON.—Carter Oil Co. continues to test the 1 J. L. Wilson, Travis Peak discovery in the Pickens field area, 30-12n-3e, Yazoo County.

Another test for the Pickens area has been announced by Ryan Oil Co. for the 1 J. E. Maxwell, SE NE 14-12n-2e, approximately 2½ miles north and 1½ miles west of the Carter 1 Wilson. Test is on a farmout from Sinclair Oil & Gas Co. and Kingwood Oil Co. Farmout agreement calls for a well to sufficient depth to test the horizon being tested in the Carter 1 Wilson, but not to exceed 8,500 ft.

Humble Oil & Refining Co. D-1 Mrs. C. L. S. McKittrick et al, Adams County discovery, tested 38 bbl. of 27°-gravity oil on pump through ¾-in. choke. Tubing pressure was 20 psi.

Mississippi's deepest drilling well, George Vasen 1 fee, 9-2s-11w, is coring at 14,815 ft. in sidetracked hole. Several drill-stem tests have been run on the well, with only gas being recovered.

Currently, there are two active wildcats in Adams County, with two more preparing to spud and one building derrick. Dorris Ballew and B. C. Callon are fishing at 5,322 ft. in the 1 Jefferson Smith, 46-7n-2w. Humble is drilling below 8,238 ft. in the 1 Richmond Corp., 24-7n-3w. Humble also has one well shut in waiting on orders, and two discoveries testing on pump.

The 14 new locations include 4 wildcat starts, 1 each in Jefferson and Franklin counties, 2 in Yazoo County, and 3 in Adams County. There were no successful exploratory wells finaled. However, three

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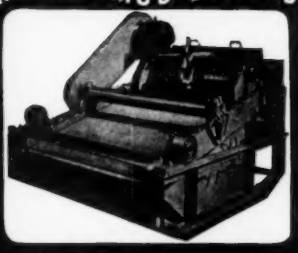

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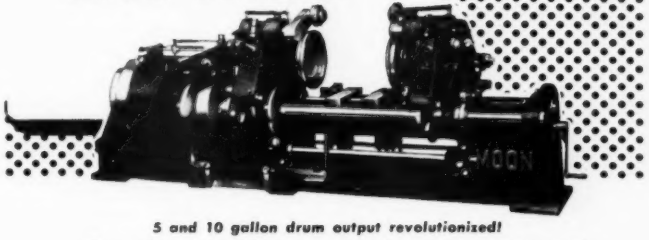

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were reported dry, two in Adams County and 1 in Claiborne County.

There were two dry wildcats completed in Florida, one each in Monroe and Taylor counties.

MISSISSIPPI WILDCAT FAILURES

Adams County: Dorris Ballew, Inc., 1 E. L. Hamilton Est., 32-5n-3w, dry, TD 7,005 ft.

Kemp Drilling Co. et al 1 R. E. Coffman et al, 22-5n-2w, dry, TD 7,020 ft.

Claiborne County: The California Co. 1 A. R. Walker et al Unit, 18-10n-3e, dry, TD 10,149 ft.

FLORIDA WILDCAT FAILURE

Monroe County: Coastal Petroleum Co. 1 H. R. Williams, 25-59s-40e, dry, TD 6,702 ft.

Taylor County: Gulf Refining Co. 1 Block 33 Brooks-Scanlon, Inc., 18-4s-9e, dry, TD 5,243 ft.

SOUTH LOUISIANA

California Co. Logs 18-Ft. Sand Near Barataria

NEW ORLEANS.—One-half mile southeast of production in Barataria field, Jefferson Parish, The California Co. is reported to have logged an 18-ft. oil sand in the 17 Fleming Plantation, 1-16s-23e. Operators are drilling ahead past 10,000 ft. to go deeper in search of other sands. The oil sand was logged at 8,454-72 ft.

New pay has been opened in Fordoche field of Pointe Coupee Parish with completion of The Texas Co. 1 Mrs. R. A. P. Price Unit 2. Operators cemented 7-in. string on bottom, 9,200 ft., and perforated 8,868-74 ft. for completion. The well flowed 136 bbl. of 39.6°-gravity oil daily through ¼-in. choke, with 675 psi. flowing pressure on the tubing and gas-oil ratio of 5,227. Log released on the well indicates a gas-distillate sand from 7,990-8,002 ft.; oil sand from 8,122-40 ft.; gas or oil from 8,214-32 ft.; gas from 8,324-32 ft.; gas from 8,341-75 ft.; gas from 8,418-40 ft.; gas distillate from 8,572-605 ft.; gas distillate from 8,827-49 ft.; oil (new sand) from 8,869-74 ft.; oil from 8,927-41 ft.; gas distillate from 8,998-9,009 ft.; gas from 9,056-70 ft., and gas from 9,139-60 ft.

Magnolia Petroleum Co. has teed off on its B-2 State Lease 670, Gulf of Mexico wildcat off Terrebonne Parish. The test, projected to 11,300 ft., is in the Eugene Island area, Block 58.

Meanwhile, off Plaquemines Parish in the South Pass area, Shell Oil Co. is reported to have shows of oil and gas in the 1 State Lease 1,008. Operators are drilling below 10,950 ft. and preparing to run log and drill to contract depth.

Ohio Oil Co. continues to core below 8,300 ft. in the 1 E. W. Brown, Jr., wildcat, 6½ miles southwest of Vinton field, 20-11s-13w, Calcasieu Parish. A slight amount of oil was recovered on drill-stem test from 7,667-84 ft., and on a later test from 7,980-91 ft., 43°-gravity oil was recovered. On a test from 7,986-97 ft., operator recovered 3,960 ft. of 39°-gravity oil, with bottom-hole flowing pressure of 1,660 psi.

The 20 new locations include 2 wildcat starts, 1 each in Cameron and Terrebonne parishes. There was one successful exploratory well completed in Pointe Coupee Parish, while two were dry, one each in Acadia and St. Martin parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Pointe Coupee Parish: New pay at Fordoche—The Texas Co. 1 Mrs. R. A. P. Price Unit 2, 28-6s-8e, top pay 8,868 ft., TD 9,200 ft., perf. 8,868-74 ft., IP: 136 bbl. oil per day, ¼-in. choke, GOR 5,227, TP 675 psi, 39.6° grav.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: A. J. Bankhead 1 Wallace Dupont, 19-10s-2e, 2½ mi. NE of South Crowley production and 6 mi. SW of Rayne townsite, dry, TD 9,514 ft.

St. Martin Parish: Humble Oil & Refining Co. D-1 Schwing Lumber & Shingle Co., Bayou Chene area, 34-10s-9e, 4 mi. S of Lake Mongoulois, dry, TD 10,819 ft.

MICHIGAN

Two Richfield Zone Discoveries Being Tested

MOUNT PLEASANT.—Two potential new Richfield zone discoveries in Northern Michigan were being tested after acidization while a possible north and west extension to Coldwater Dundee oil pool, Isabella County, was showing 3,000 ft. of free oil at a point 5 ft. in the objective on a 24-hour fill-up test.

In Roscommon County, just short of a mile northeast of St. Helen (Richfield) pool, well was being tested after a two-stage acidization with 1,000 and 2,500 gal. at 4,287 ft., total depth. Hole carried 850 ft. of free oil natural and early tests indicated production of approximately 25 bbl. a day.

In Ogemaw County, on the so-called Mio Unit block owned by Sohio Petroleum Co. and Ohio Oil Co. jointly, United Drillers & Producers, Inc., 3 State-Rose, SE SW NE 4-24n-3e, was being flow tested after third acid treatment, this time with 6,000 gal. On a 6-day flow test, well averaged about 30 bbl. in 1 hour after which time flow died. Casing pressures showed an increase each day when opened ranging from 400

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to 850 lb. After each flow period (1 hour) pressures had dropped to 50 lb. Well is being tested in the Richfield at 4,270 ft., total depth.

Scott Drilling, Inc., 1 Bristol, S½ SW SE 19-16n-6w, Coldwater Township, Isabella County, showed 3,000 ft. of free oil from the Dundee in 24 hours at 3,819 ft., 5 ft. in the pay. Although the 1 Bristol is a north offset (40-acre spacing pattern) to a producer, it appeared to be a possible north and west extension of the field. Well was reported to be from 1 ft. lower to flat structurally with the offset well, possibly indicating a continuation of the producing horizon of this pool. It is the first producer in Section 19.

MICHIGAN WILDCAT FAILURES

Allegan County, Casco Township: Norman L. Stevens 1 Fowler, SW NE NW 17-1n-16w, Traverse 1,145 ft., dry, TD 1,147 ft.

Ganges Township: F. W. Kehlet 1 Raymond, SW NE SE 26-2n-16w, Traverse 1,197 ft., dry, TD 1,229 ft.

Hopkins Township: Fisher-McCall Oil & Gas, Inc. 1 Krug, NE SE NW 28-3n-12w, Traverse 1,688 ft., dry, TD 1,721 ft.

Lee Township: Louis Zellman 1 Crandall, SW NW SE 33-1n-15w, Traverse 1,169 ft., dry, TD 1,170 ft.

Berrien County, Buchanan Township: Norman Nelson 2 Speckline, NE SE NW 32-17s-18w, dry in Traverse, TD 521 ft.

Kent County, Spencer Township: Mercer Oil Co., Inc., 1 Penny, SE NE SE 5-10n-9w, Dundee 3,170 ft., dry, TD 3,261 ft.

Mason County, Victory Township: D. B. Lesh Drilling Co. 1 Pratt, NW SW SW 35-19n-17w, Traverse 1,672 ft., dry, TD 1,680 ft.

Missaukee County, Enterprise Township: Union Development Co. A-1 State-Enterprise, S½ NE SW 3-23n-5w, dry in Richfield, TD 4,724 ft.

ROCKY MOUNTAIN

Central Nebraska Test Gets Oil Discovery

DENVER—Oil was recovered from a zone in the Kansas City limestone in a rank wildcat in south central Nebraska this week. On drill-stem test at the Earl Evans 1 fee, C SE SW 6-3n-27w, Indianola area wildcat, Red Willow County Nebraska, the well made 60 ft. of clean oil and 70 ft. of oil-cut mud with 50 ft. of mud in 30 minutes between 3,292-3,306 ft. Previous tests between 3,194-3,206 ft. showed 15 ft. of slightly oil-cut mud in 10 minutes and 3,213-50-ft. recovery was 30 ft. of mud and 30 ft. of oil-cut mud in 30 minutes. Bottom-hole pressure was 800 lb. The Kansas City was topped at 3,191 ft. and the well went into Granite Wash at 3,550 ft., total depth. Evans and his associates, who are McCook, Neb., businessmen, cemented casing at 3,368 ft. and will perforate for completion tests on the wildcat. This well was reportedly on a surface high on the north side of the Darton arch. It is probable that the operator will acidize the zone after initial tests and it may be that the well will be an interesting discovery in this central Nebraska area.

Gas was recovered on drill-stem test in Ohio Oil Co.'s second and third wells in the Huntsman area, Cheyenne County, Nebraska. The company is now drilling below 4,872 ft. at its 1 Mather, NW SE NW 12-14n-50w, 1½ miles northwest of Ohio's Huntsman gas-discovery well. Third Dakota was topped at 4,801 ft. and successive drill-stem tests in that formation have shown gas volumes comparable with those made in the discovery well. The discovery was completed recently for an open-flow volume of 54 million cubic feet of gas daily with production from zones in the Third Dakota sand. This confirmation indicates that Ohio has a considerable gas reserve in the area

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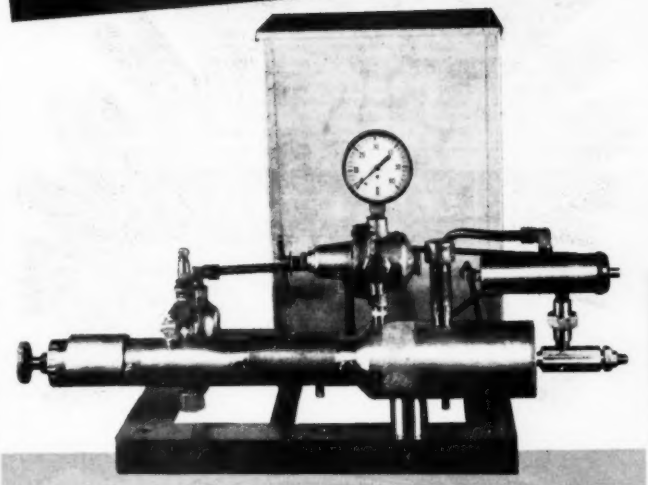

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and it is probable that marketing plans will now be completed for the gas. One and a half miles northwest of 1 Mather, Ohio is drilling below 4,835 ft. at its 1 Gurschke. First Dakota was topped at 4,719 ft. and the operator recovered oil on tests in that formation. The well is now in Third Dakota sand and it is reported that gas has been tested in that formation.

In the Glenrock area, Wyoming, three wells are now at interesting stages but information concerning tests and formations is being withheld. Phillips Petroleum Co. 1 Brubaker, SW SW SW 33-34n-75w, is now drilling below 7,085 ft. and probably in the Muddy formation productive in the discovery well. Shows in the Wall Creek sand were reported in this extension. Steelco Drilling Co., of Chicago, is below 6,850 ft. at its 1 Moore, SW SW NE 34-34n-75w, and reportedly still in the Niobrara shale. The well is believed to be running low structurally. The same company's 1 Robbins, SW SE SW 33-34n-75w, is now in the Wall Creek formation and reportedly has staining in those sands. Activity in this area is of interest following Steelco's Muddy sand discovery several weeks ago.

New locations.—There were nine new locations during the week, with five in Wyoming and one each in Colorado, Montana, Utah, and northern New Mexico. In the East Sussex area, Johnson County, Wyoming, Bill Tomberlin of Casper has made location for an interesting wildcat at 1 Taylor, in C SW SW 19-41n-77w. This is the first of a series of wildcat wells east of Sussex and Meadow Creek pools and the present test is to go to the Wall Creek sands at around 6,000 ft. M. B. Siegel has made location for a 2,000-ft. Weber sand test on a block farmed out from Phillips Petroleum Co. on the East Rifle Creek area, Garfield County, Colorado. The well is 1 Bowen Lot, 3-3-5n-92w.

Completions.—There were 16 wells completed with 10 in Wyoming and 2 each in Colorado, Montana, and western Nebraska. In Wyoming, G. L. Smith plugged a failure in the south Lodgepool area northwest of West Mush Creek pool, Weston County, Wyoming. In Colorado, Carter Oil Co. abandoned its Fort Morgan wildcat after failing to find production through the Morrison. Phillips Petroleum Co. abandoned its Rattlesnake Coulee wildcat, Toole County, Montana. In western Nebraska, M. M. Newell et al plugged their second wildcat in the Esther area, Dawes County, after failing to find production through the Wall Creek sands.

WILDCAT FAILURE IN WYOMING

South Lodgepole, Weston County: G. L. Smith 1 Government, SW SW SW 30-44n-65w, 6,596 TD; abnd.; Pierre 1,868, Niobrara 4,800, Newcastle 6,304, Dakota 6,497 ft.

WILDCAT FAILURE IN COLORADO

Fort Morgan, Morgan County: Carter Oil Co. 1 Jesse M. Blanchard, C SE NE 11-6n-55w, 6,064 TD; abnd.; Hygiene 2,595, Dakota 5,238, Fuson 5,369, Lakota 5,493, Morrison 5,671, Permian 5,848 ft.

WILDCAT FAILURE IN MONTANA

Rattlesnake Coulee, Toole County: Phillips Petroleum Co. 1 Government, SE SE NE 17-36n-3w, 2,238 TD; abnd.; Blackleaf 710, Kootenai 1,515, Sunburst 1,930, Morrison 1,948, Madison 2,211 ft.

WILDCAT FAILURE IN NEBRASKA

Esther area, Dawes County: M. M. Newell et al 2 Neeland, C SW NW 32-30n-48w, 1,578 TD; abnd.; Niobrara 1,140, Carlisle 1,495, First Wall Creek 1,569-73 ft.

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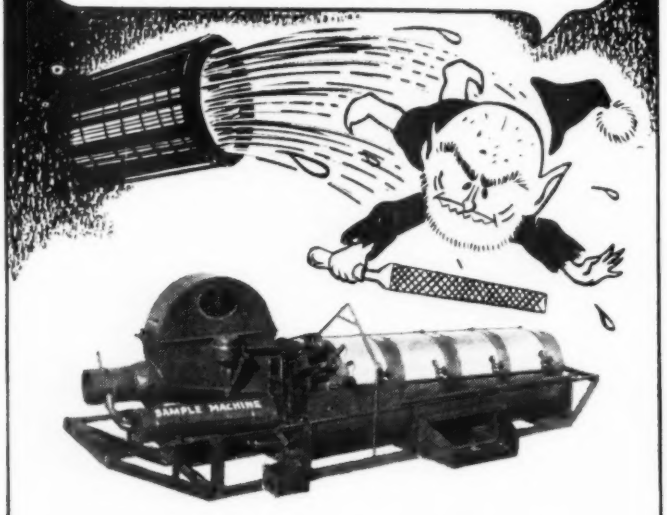

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APPALACHIAN FIELD

Oriskany Sand Tests For Three-County Field

PITTSBURGH—Operations have been announced at two locations for Oriskany sand tests in the present new development in the Wirt, Wood, and Jackson counties field, West Virginia. Tucker district, Wirt County, Glen W. Roberts 1 Forrest Daugherty, elevation 1,066 ft., 3.05 miles south of Lat. 39°, 05′ and 3.0 miles west of Long. 81°, 30′. Steele district, Wood County, Columbian Carbon Co., 1144 Harry Beard et al, elevation 1,028 ft., 2.10 miles south of Lat. 39°, 05′ and 2.85 miles west of Long. 81°, 30′. Both are on the Belleville Quadrangle.

Drilling progress in other wells in this area is noted: Steele district, Wood County, Godfrey L. Cabot, Inc., 1313 G. P. Burkhart 4,706 ft.; Columbian Carbon Co., 1139 A. C. Radcliff et al 5,077 ft.; Hope Natural Gas Co. 9409 A. J. Holbert, 475 ft.; United Carbon Co. 1682 M. E. Stuckey, spudding; Tucker district, Wirt County, Godfrey L. Cabot, Inc. 1317 Thomas Hughes, 4,535 ft.; Glen W. Roberts 1 H. W. Stephens, 1,190 ft.; United Fuel Gas Co. 6549 S. O. Tonceray, 2,184; 6550 T. S. Counts, 2,550 ft.; and 6552 R. J. Moore 1,012 ft. Grant district, Jackson County, Davis-Kelly Gas Co. 1 E. E. Conger et al is building rig. A good shallow-sand gas well was reported in Oceana district, Wyoming County, United Producing Co. 15-1516 Pardee Land Co., 2,374,000 cu. ft. of gas in the Maxton sand, total depth 2,950 ft.

New locations reported in West Virginia were 12: Sherman district, Calhoun County; Union district, Jackson County; Triadelphia district, Logan County; Grant and McKim district, Pleasants County; Teays Valley district, Putnam County; Grant district, Ritchie County; Union district, Tyler County; Grant district, Wetzel County; Tucker district, Wirt County; and Steele district, Wood County.

Two good shallow-sand gas wells were brought in in West Bethlehem Township, Washington County, Pennsylvania: Manufactures Light & Heat Co. 1 Grace Goughnour, 1,980,000 cu. ft. of gas in the Big Injun sand, total depth 2,041 ft.; 2 Floyd

B. Longstreth, 1,332,000 cu. ft. of gas completed at depth of 3,016 ft. Georges Township, Fayette County, Orville Eberly et al 1 N. E. Murphy at a depth of 7,489 ft. encountered a fishing job. Efforts are being made to remove two strings of tools from the hole. Wharton Township, William E. Snee et al 3 Indian Creek Coal & Coke Co. is drilling in the Oriskany sand at 7,398 ft. Croyle Township, Cambria County, Peoples Natural Gas Co. 1-3878 Joseph Gavany, elevation 2,245 ft., is shut down at 4,058 ft. Derry Township, Westmoreland County, this company's 4-3814 Camilla Giffen, after installing new wire line, is cleaning out and straightening bad hole at a depth of 9,047 ft. Napier Township, Bedford County, South Penn et al.-Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., is at depth of 6,375 ft.

New locations reported in Southwest Pennsylvania were four: Boggs Township, Armstrong County; Amwell Township, Washington County; and Bell Township, Westmoreland County.

KANSAS

Stafford County Discovery Has Maximum Potential

SHELL OIL CO. has given Stafford County another pool in the area about ¾ mile south of Rattlesnake pool. Shell 1 Miller, NE SW SE 14-24s-14w, has been assigned top bomb potential rating of 3,000 bbl. daily from the Lansing-Kansas City at 3,760-82 ft. Well was drilled to a total depth of 4,300 ft. after cutting the Arbuckle at 4,209 ft. Casing was set to 3,890 ft. but lower zones showed mostly water. After plugging back to 3,795 ft., casing was perforated with 20 holes at 3,776-82 ft. and treated with acid to flow 35 bbl. of oil per hour for 5 hours through 29 64-in. choke. Additional perforations were made at 3,760-74 ft. and the well made 43 bbl. in 1 hour through 28 64-in. choke after 1,500-gal. acid treatment.

Cheyenne View pool in Barton County was given a new producing horizon with the completion of Lion Oil Co. 1 Louis, NW NW SW 12-19s-12w, a south offset to the discovery well which was completed last November as an Arbuckle producer. The 1 Louis was drilled to 3,445 ft. in the Arbuckle but was plugged back to 3,200 ft. after finding water in the lower horizon. Top of the Lansing was called at 3,107 ft. Casing was perforated with 60 shots at 3,152-60 ft. and after treatment with 100 gal. of acid, the well flowed 35 bbl. of oil per hour for 4 hours. The discovery well, Aladdin and Crowe, 1 Kultgen, SW SW NW 12-19s-12w, on a drill-stem test of the Lansing-Kansas City, had a recovery of 2,600 ft. of oil and gas-cut mud. Later, Aladdin and Crowe 1 Schwartz, ¾ mile southwest of the discovery well, found the Arbuckle dry and was completed in the Lansing to open Cheyenne Southwest.

Texas Pacific Coal & Oil Co. 1 Krehbiel, SE SW SE 11-20s-3w, McPherson County, is making a well in the Mississippian. Lansing was cut at 2,370 ft., the Mississippi at 3,014 ft. and hole carried to 3,056 ft. Casing was set to 3,015 ft. and well had 1,700 ft. of fluid in the hole, including 100 ft. of oil, after a period of 16 hours. On preliminary tests, the well was reported to be producing about 2 bbl. per hour.

KANSAS SUCCESSFUL WILDCATS

Ellis County: Petroleum, Inc., 1 Froelich, SE SE SW 22-12s-16w, 195 bbl. from Lansing at 3,278-84 ft., TD 3,495 ft.

Graham County: Peel-Hardman 1 M. P. Sutor, SE SE SE 18-9s-21w, 3,000 bbl. from Arbuckle at 3,829-40 ft., TD.

Rooks County: Nadel & Gussman 1 E. Sutor, NE NE SE 26-10s-20w, 505 bbl. from Arbuckle at 3,729-33 ft., TD.

KANSAS WILDCAT FAILURES

Barton County: Flournoy & Williams Drill-

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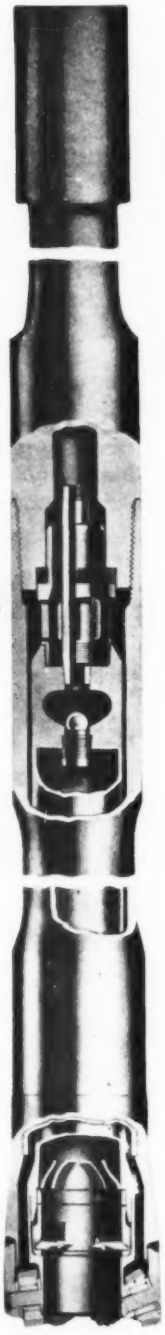

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ing Co. 1 Laudick, SE SE NE 24-18s-14w, dry, TD 3,480 ft.

Cowley County: Deardorf Oil Co. 1 Rockwell, SE SE SE 29-32s-3e, dry, TD 3,605 ft.

Ellis County: Jones-Shelburne & Farmer 1 Wendling, C S 2 SE NW 2-11s-20w, dry, TD 3,745 ft.

Dolly Oil Co. et al 1 Witt, SW SW NW 33-12s-16w, dry, TD 3,555 ft.

Stafford County: Kiowa Drilling Co. 1 Durham, NE NE NE 27-22s-13w, dry, TD 3,886 ft.

Crown Oil Co. 1 Saylor, NE NE SW 12-23s-14w, dry, TD 4,005 ft.

Harbar Drilling Co. 1 McCandless, SE SE SE 18-25s-13w, dry, TD 4,336 ft.

Sumner County: McNeish & Grallopp 1 Kerr, C NW NE 34-34s-2w, dry, TD 4,711 ft.

CALIFORNIA

Redrilling and Deepening On Par With New Wells

LOS ANGELES—Redrilling and deepening work is almost even with new well notices. During the last 2 weeks 55 redrill jobs were listed as compared with 60 new wells. To date redrill work has run about 65 per cent of new work. This ratio is up sharply from last year when such work averaged 43 per cent. The bulk of the redrill work is in Willmington field and results from the November earthquake.

The Superior Oil Co. wildcat 18-2 U. S. Government is apparently due for abandonment. Located in 2-11n-28w, about 2 miles north of the White Rock area of Russell Ranch field, the well was at first reported as a new discovery. The reports came from the finding of oil sands, considered the equivalent of the Colgrove, and with good saturation. There was no flow on test and rather poor showings on pulling drill pipe. The sands were located near hole bottom, 5,387 ft.

The January discovery of Humble Oil & Refining Co. southeast of the Del Valle area will receive another test. Location has been set for 2 Newhall Land & Farming Co. at 13-4n-17w. Site is about ½ mile from the discovery well in Section 23-4n-17w. The new field found by this well has been named Castaic Junction field.

Formation test on the second try in the far southeast end of Cuyama Valley recovered 2,700 ft. of fresh water. The well is the C. W. Colgrove 64-12 Reyss, in Section 12-7n-24w. The formation was in the interval 4,105-45 ft. The well is now idle at 4,145 ft., bottomed in granite.

Robert S. Lytle and Union Oil Co. are planning a test in the Olive View area. Location is set near the intersection of Foothill Boulevard and Glen Oaks Road.

F. C. Griggs & Associates have recompleted the Cuyama Valley discovery well at 3,420 ft. Completion is in the Dibblee with flow of 1,500 bbl. per day of 38 - gravity oil.

Pedro Petroleum Corp. 1-A is drilling ahead after announcement of plans to abandon. Site is in the Tejon Hills area, 14-11n-18w. Depth has passed 800 ft.

C. M. Rood has taken over the former Jesse M. Butler wildcat, 1 Anita. Site is in the Solemint Canyon area, 14-4n-15w. Operations on this test have been suspended since last November. Well was bottomed at 1,285 ft. Deepening has carried past 1,700 ft.

CALIFORNIA WILDCAT FAILURES

Contra Costa County, Rio Vista area: Sesnon et al., 1 Sesnon, 24-2n-2e, dry, test at 6,920-51 ft. recovered salt water, TD 6,951 ft., elev. 50 ft.

Kern County, South Maricopa area: H. W. Orwig 1 Orwig, 14-10n-23w, dry, TD 1,508 ft., elev. 2,000 ft.

South Premier area: Harry H. Magee 1 Richfield fee, 33-28s-27e, dry, TD in Chanac 2,825 ft., elev. 566 ft.

Kings County, Hanford area: Independent

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Exploration Co. 52 Bennett-Smith, 31-18s-23e, dry, Cretaceous 5,900 ft., no Krcyenhagen, TD 6,015 ft., elev. 262 ft.

Riverside County, Corona area: Frontier Petroleum Co. 1 Barger, 28-4s-6w, dry, no shows, TD 1,060 ft., elev. 998 ft.

San Luis Obispo County, Shandon area: General Petroleum Corp. 84-25 Clarke, 25-26s-14e, dry, TD in granite 5,687 ft., elev. 1,115 ft.

Santa Barbara County, South Cuyama area: Richfield Oil Corp. 71-25 O'Meara, 25-11n-28w, dry, TD 5,415 ft., elev. 2,131 ft.

Ventura County, Simi area: Northridge Oil Co. 2 Simco, 31-3n-17w, dry, TD 1,220 ft., elev. 970 ft.

Ventura Avenue area: Union Oil Co. 88-14 Fraser, 14-3n-23w, dry, TD 920 ft., elev. 1,064 ft.

N. CENTRAL TEXAS

Several Counties Get New Wildcat Locations

WICHITA FALLS—Several counties received new wildcat locations this week, to 5,000 ft. or deeper.

In Archer County, Ted Weiner staked location for the 1 Olin Calvin, a 5,200-ft. Mississippian test in the R. Grooms Survey, 2 miles southwest of Anarene and the same distance northwest of a lone Mississippian producer.

In Montague County, B. F. Phillips, Jr. staked location for 1 W. M. Brooks, in Block 10, MEP&P Survey, ½ mile southwest of a Bend conglomerate discovery and only producer, 4½ miles southwest of Nocona. It was scheduled to 5,500 ft.

A. V. Grant 2 Varnor Pitman, wildcat 10 miles north of St. Jo and 2 miles northwest of Davenport field, James Ferguson Survey, A-261, was scheduled to 2,600 ft.

Warren Oil Corp. located its 1 M. L. Smith in the Joseph Bailey Survey, A-141, 6 miles northwest of Jacksboro in Jack County. Location is in a new Ellenburger area, but has been scheduled to 3,700 ft. to test the Strawn sand.

Mid-Continent Petroleum Corp. will seek to confirm production at its new Ellenburger strike 3 miles northwest of Cundiff, northeastern Jack County, at its 2 Roy Cherryhomes, 1,263 ft. from south and 3,680 ft. from west lines of the J. Irwin Survey. The 7,000-ft. project is 990 ft. northeast of the discovery.

In northwestern Young County, T. T. Cannon, of Henderson, has staked location for 1 W. F. Bailey, 330 ft. from north and 450 ft. from west lines, Block 166, TE&L Survey. The 6,000-ft. test is 4 miles northwest of Olney and 2½ miles northeast of a small Mississippian discovery drilled by Pure Oil Co.

In south-central Jack County, new Bend conglomerate production was opened at Russell Maguire 1 E. C. Richards, T. Martinez Survey, 6 miles south of Jacksboro, which completed for a flowing potential of 42 bbl. of oil in 20 hours. Gage was through 4 64-in. choke, from pay at 5,321-38 ft. Nearest conglomerate production is the Worsham-Steed field, 3 miles to the east.

Bridwell Oil Co. 1 Carl Sanzenbacher, Block 9, Grayson County School Lands Survey, 2½ miles north of Blue Grove in Clay County, was indicating a ½-mile north extension to Fields Caddo field, on the basis of a drill-stem test. The tool was open 75 minutes, from 5,820-36 ft. Gas showed at the surface in 3 minutes and recovery was 50 ft. of free oil, plus 100 ft. of heavily oil and gas-cut mud. Bottom-hole pressure was 2,500 psi.

According to reports, if the pay on the 1 Sanzenbacher is the Caddo lime and not Caddo conglomerate, the pay section is about 100 ft. higher than Jack Grace Production Co. 1 W. C. Fields, discovery well in Block 19 of the same survey.

Bridwell had scheduled a new wildcat 4 miles south of Iowa Park in the R. J. Scot Survey, A-256, in Wichita County. Drillsite is 2,127 ft. from south and 990 ft. from the west lines of lease, or 990 ft. from west line and 1,320 ft. from south lines of the Survey. The proposed 4,200-ft. rotary is 660 ft. east of Bridwell 1 Roller.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Jack County, new field: Hill & Hill 1 S. H. Peavy, 330 ft. from N and E lines, T. W. Ellsberry Sur., A-1251, 5½ mi. W Jacksboro, TD 3,045 ft., elev. 1,191 ft., top sand pay 3,033 ft., IP pumped 93.7 bbl. 41°-grav. oil a day, GOR 200 cu. ft.

Newman Bros. Drilling Co., Big Bear Oil Co. and Alaska Steamship Co. 1 Cherryhomes, L. L. McKinley Sur., 10 mi. E Jacksboro, completed as shut-in gas discovery; TD 5,810 ft., top conglomerate pay 4,980 ft. gas a day from 144 perforations at 4,980-5,019 ft.

Jones County, 1-mi. S extension to Bartlett field: North American Oil Consolidated 1 J. A. Lollar, 660 ft. from E and S lines, 32-2-SPRR, 7 mi. W Anson, TD 3,200 ft., elev. 1,863 ft., Swastika sand pay 3,194-3,200 ft., IP pumped 70 bbl. 43°-grav. oil a day.

Stephens County: W. J. Rhodes 1-A Black Bros., Sec. 1,136, TE&L Sur., 10 mi. NE Breckenridge, TD 3,339 ft., elev. 1,223 ft., top Caddo 3,287 ft., pay 3,228 ft., acidized 3,281-3,333 ft., IP pumped 21 bbl. 36°-grav. oil, plus 60 per cent water.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Neeld & Hood 1 T. L. Wolf, Lot 83, Blk. 4, Clark & Plumb Subd., 7 mi. SE Archer City, dry, TD 3,500 ft.

Konrad Sztykgold 1-A Shell Oil Co. fee "A," League 3, Blk. 3, Denton CSL, 2 mi. NE Holliday, dry, TD 1,826 ft.

Brown County: Evans, Neeb & Austin 1 J. C. Murphy, Geo. Lewis Sur. 37, 4 mi. SW May, dry, TD 1,822 ft., missed sand.

Callahan County: Castle Oil Co. and C. C. Winfrey 1 A. E. Dyer, 27-8-SPRR, 7 mi.

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NW Clyde, dry, TD 2,010 ft., elev. 1,895 ft.

Carl Lummus et al 1 T. N. Jackson, Sec. 98, BBB&C Sur., 6½ mi. N Baird, dry, TD 1,285 ft., Tannehill sand with odor 918-919 ft., sand stringer 1,120-35 ft.

Coleman County: United North & South Development Co. 1 R. M. Freeman "B," J. H. Gibson Sur. 5, 3½ mi. S Novice, dry, TD 3,298 ft., elev. 2,107 ft., Winchell lime (Canyon), 2,785-2,823 ft., no shows.

Comanche County: Haynes B. Ownsby Drilling Co. 1 H. J. Huddleston, 24-2-H&TC, 2 mi. S Duster, dry, TD 3,156 ft., elev. 1,402 ft., Ellenburger 2,986 ft.

Fisher County: Gem Oil Co. 1 M. Medrano, SW NW 104-2-H&TC, 6 mi. S Rotan, dry, TD 7,073 ft., elev. 2,095 ft., Valera 2,957 ft., Wolf Camp 3,335 ft., Noodle 4,000 ft., Gunsight 4,610 ft., Mississippi 6,843 ft., Ellenburger dolomite 6,958 ft.

Hardeman County: Youngblood & Foree 1 D. L. Kellough, 16-H-Waco & Northwestern RR Sur., 7 mi. N Chillicothe, dry, TD 6,588 ft.

Jack County: Akin & Dimock 1 H. C. Moore, J. Lasater Sur., A-364, 7 mi. SE Bryson, dry, TD 2,020 ft.

(Continued on page 170)

CANADIAN FIELDS

Two New Oil Producers Added to Excelsior Pool

CALGARY.—The Pacific Petroleum group has an assured success at its initial Excelsior venture, and has run production string of casing after penetrating over 60 ft. of D2 oil-bearing zone in the Devonian horizon. It is expected that cement plug will be drilled out soon and the well placed on production tests. Marking the third oil producer for the newly rated Excelsior field, Pacific-Excelsior 1, LSD 13, 2-56-24w4, extended that field, discovered by Imperial Oil, Ltd., about 1 mile eastward. The Pacific, Atlantic, Sunray, Calvan and Tower team has already staked site for its next well ¼ mile south of the No. 1, and will commence drilling operations at that second venture as soon as rig is shifted to location.

The Golden Spike field got its third success when Imperial, also discoverer of that field, placed its Golden Spike 5, LSD 1, 27-51-27w4, on production. The well, about ⅝ of a mile northeast of the discovery, found a record 560 ft. of oil-bearing D3 zone and rated an initial potential of 1,598 bbl. daily during a restricted flow test without acidization. The discovery well, on open flow, poured out crude at the rate of 12,000 bbl. daily after acid.

A. G. Bailey Co. of Calgary and associates received an encouraging show of natural gas in what is believed to be the lower Cretaceous at their Bailey-Spedden 1, wildcat about 75 miles east-northeast of Edmonton in LSD 5, 1-60-13w4. Operators ran a drill-stem test at 1,625 ft. and received a gas flow measured at 750,000 cu. ft. daily, no oil or water. Drilling is now proceeding at 2,725 ft. in search of the well's Devonian objective.

Pacific Petroleums, Ltd., found natural gas in the Viking sand at a farmout test secured from Imperial Oil, Ltd. The new gas strike, Pacific-Deadman 1, LSD 8, 32-56-27w4, about 29 miles northwest of Edmonton, ran a drill-stem test of the interval 3,008-18 ft., and received a flow rate of 2,500,000 cu. ft. daily, plus a slight spray of oil. The well is now heading for the lower Cretaceous and Devonian objectives.

Twelve wells were completed in Alberta during the past week, boosting total completions for this year to 55—Redwater, 5 oil wells; Leduc, Woodbend, and Golden Spike, 1 oil well each; 4 dry wildcats as follows:

Imperial-Willingdon 2, LSD 11, 20-55-15w4, TD 3,625 ft.

Imperial-Magloire 1, LSD 8, 17-80-21w5, TD 7,770 ft.

Imperial-Pinedale 1, LSD 7, 28-54-16w4, TD 4,591 ft.

Central-Del Rio 2, LSD 16, 31-55-24w4, TD 4,156 ft.

OHIO, KENTUCKY

Deavertown Field Gets Two Edge Developments

COLUMBUS.—The Foraker Drilling Co. 1 Gibbs-Knapp, Section 36, York Township, Morgan County, along the eastern edge of Deavertown pool, drilled through the Clinton at 3,884-3,944 ft. with no showings, and the Medina at 3,975-79 ft. with 667,000 cu. ft. of gas natural gas and 1,200,000 cu. ft. after shot. On the west side of the pool, Ohio Fuel Co. 3 E. M. Hull, Section 35, made 58 bbl. in 64 hours with 230,000 cu. ft. of gas after shooting the Clinton.

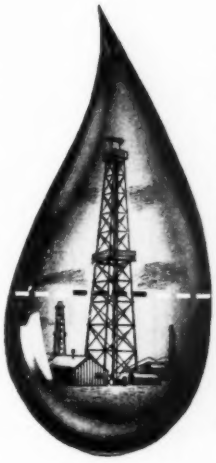
In Jackson Township, Knox County, Allen Willey 2 Evert Moran, Section 19, topped the Clinton at 2,960 ft. with 350,000 cu. ft. of gas and a small showing of oil at 54 ft. in. The well will be turned into the line for some time, then drilled through the sand, and shot. In Jefferson Township, Ray Penick 2 Stetzline, Section 21, topped the Clinton at 3,083 ft. and at 17 ft. in had 440,000 cu. ft. of gas.

Frank Lyons et al has started a second test, south of Ravenna in Rootstown Township, Portage County, ½ mile southwest of their discovery and on the Peter Bosko tract in Lot 6.

New locations are up some at 18 for

First in

CANADA'S OIL FIELDS



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the week, but ground conditions do not permit much heavy moving at this time.

EASTERN KENTUCKY

ASHLAND—In Cumberland County, 9-C-50, the deep Knox dolomite test of Cooley Ellis et al 1 Merley, is shut down at 2,200 ft. pending further orders. Well is thought to be bottomed in the Knox formation although no pertient data have been released to date.

On north end of the old Ida May pool of Lee and Owsley counties, Douglas Parrish has a dry hole at 15 David Mays. Corniferous lime, the usual productive horizon, was topped at 1,170 ft. and drilled to a total depth of 1,255 ft. with no commercial showings. Test has been abandoned.

In Lawrence County 22-T-83 Davis et al have a prospective well at 1 Phil Preece, not far south of the county seat of Louisa. Located in the southern sector of the Fallsburg-Louisa pool, test topped Berea (Mississippian) sand at 1,798 ft. and had a reported fillup of 350 ft. of oil to a total depth of 1,834 ft. Operators will run rods and tubing for production test.

EASTERN KENTUCKY WILDCAT FAILURE

Pike County: R. E. Riley et al 3 J. S. Cline, Marion Branch of Levisa Fork, dry in Silurian and Ordovician formations, Big lime 1,728 ft., Berea 2,414 ft., Corniferous 3,443 ft., Big Six 3,900 ft., Clinton 3,940 ft., Trenton 4,460 ft., plugged back to Devonian shale for gas-well completion.

WESTERN KENTUCKY

OWENSBORO—On the east side of South Morganfield pool in Union County, Sun Oil Co. has completed another good Cypress well. Sun 4 S. S. McBride, 1-N-19, was completed in the Cypress for 231 bbl. daily from pay at 2,258-89 ft. after a 58-qt. shot. Top of the Waltersburg was called at 1,840 ft.

Sun has probable Waltersburg pay at 5 McBride, in the same section. Operator is preparing to shoot the pay at 1,830-59 ft. The well was reported to be swabbing at the rate of about 1½ bbl. of oil per hour. In the same section, Sun is drilling below 889 ft. at 6 McBride and Carter Oil Co. has set surface pipe and is drilling below 360 ft. at 1 W. H. Hagan, 200 ft. from north line and 1,360 ft. from west line of the section.

In Glenville pool of Daviess County, Teller et al 3 J. C. Martain, 13N-28, has been completed in the Bethel sand at 1,675-84 ft. with an initial production of 25 bbl. per day.

WESTERN KENTUCKY WILDCAT FAILURE

Union County: Superior Oil Co. 1 B. L. Conway, SW SE NE 12-O-18, dry, TD 2,812 ft.

INDIANA

EVANSVILLE—In Plainville pool of Daviess County, National Associated Petroleum Co. 1 D. Foust and B. McBride, SE SE NW 2-4n17w, two locations west of the McClosky pay zone opener, is pump testing the McClosky at 755-66 ft. Casing was set at 754 ft. and on latest reports well was pumping 57 bbl. of oil and 3 bbl. of water per day.

National 1-A W. C. Foust, SE NW NE 2-4n-7w, two locations north of the discovery well, is shut down after encountering high gas pressure in the top of the Salem, cut at 1,170 ft. This is the same gas zone that caused the blowout in the original well when it was drilling ahead to test the Devonian.

South of the discovery well, B-L-S Drilling Co. 8 Plainville unit, NE SW SE 2-4n-7w, is waiting on cable tools to test pay at 700-804 ft. after a drill-stem test for 2 hours and 15 minutes had a recovery of 480 ft. of clean oil and 180 ft. of mud-cut

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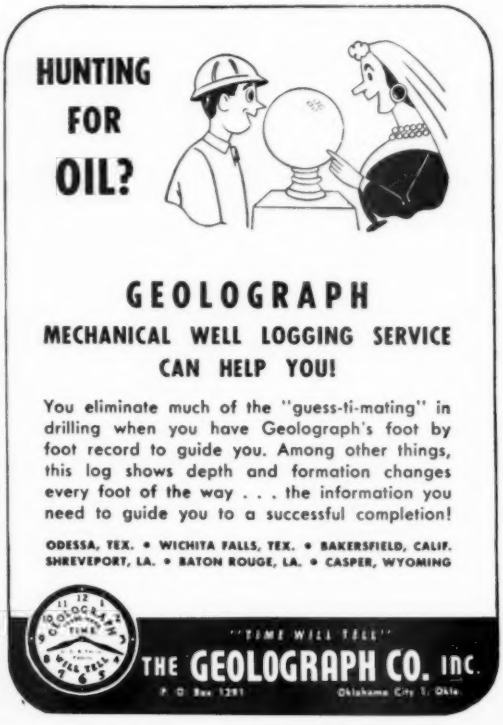
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oil. Top of Ste. Genevieve was called at 749 ft. compared with 667 ft. in the Foust-McBride well north of the pool opener.

In Spring Hill pool in Vigo County, Leo Light and V & T Drilling Co. 1-A Sutliff, SW SW SW 11-11n-9w, has been completed in the Devonian at 1,681-86 ft. with an initial production of 144 bbl. per day.

INDIANA SUCCESSFUL WILDCAT

Gibson County: Joe Reznik 1 Lillian Butler, NE SW NE 15-4s-10w, IP 25 bbl., Jackson sand 1,799-1,808 ft., TD 1,818 ft. (Discovery well for Warrentown East pool.)

INDIANA WILDCAT FAILURE

Sullivan County: G. Boyace 1 Terhune, E½ SW SE 12-8n-8w, dry, TD 2,083 ft.

ILLINOIS

Good Biehl Well Testing West of Albion Pool

MATTOON.—Calvert Drilling Co., Inc., and associates have the makings of a good Biehl well in the area north and west of development in the southern part of Albion Consolidated pool in Edwards County. Calvert Drilling Co., Inc., 1 O. R. Evans, NE SE NE 2-3s-10e, drilled to 1,987 ft. in the Biehl sand and set casing for further tests. A 1-hour drill-stem test at 1,967-87 ft. had a recovery of 300 ft. of clean oil, 90 ft. of oil-cut mud, and 120 ft. of mud, slightly cut with oil. The new well is about ¼ mile from production in the pool.

In the area just east of the southern part of Lawrence pool and just northeast of the town of Billett, Messmer Oil Co. 1 Ida Nesbitt, SW NW SW 21-3n-11w, Lawrence County, is testing McClosky lime pay at 1,890-95 ft. and 1,915-20 ft. The well was treated with 5,000 gal. of acid and swabbed 175 bbl. of oil and 20 bbl. of water per day.

The northeast extension to Rural Hill pool in Hamilton County, Calvert Drilling Co., Inc., and W. Duncan 1 Suttle, SW NW SW 4-6s-6e, has been completed in the Aux Vases at 3,097-136 ft. for 80 bbl. of oil and 15 bbl. of water per day after a 90-qt. shot.

Jasper County has new production east of Bogota pool with the completion of L. L. Chevalier 1 William Lourance, SW SW NE 3-5n-9e. The well had an initial production of 240 bbl. per day from McClosky lime at 3,064-70 ft. Same operator is cleaning out to test the west offset, 1 Adrein Gray et al after recovering 380 ft. of mud-cut oil on a drill-stem test. Ashland Oil & Refining Co. and J. W. Rudy are drilling at 2,050 ft. on the southwest offset, 1 J. Kittle.

ILLINOIS SUCCESSFUL WILDCAT

Edgar County: F. A. Bridge 1 Weaver, NE NE NW 24-14n-14w, pumped 4 bbl. per day, Pennsylvanian sand 235-65 ft. and 293-324 ft., TD 330 ft.

ILLINOIS WILDCAT FAILURES

Bond County: F. L. Barbee 1 J. Gottfried, SE NW NE 28-5n-4w, dry, TD 688 ft.

Christian County: W. Duncan et al 1 Johnston, SE NE SW 30-12n-2w, dry, TD 2,280 ft.

Clay County: Bell Brothers 1 J. E. Smith, NE NE NE 16-2n-5e, dry, TD 3,064 ft.

Douglas County: E. N. Breed 1 Owen, NW NW NW 26-15n-7e, dry, TD 990 ft.

Edgar County: P. M. Henderson 1 Linder, SE NE SE 21-13n-13w, dry, TD 572 ft.

S. R. Travis 1 Langford, NE SE SW 11-13n-12w, dry, TD 780 ft.

Marion County: Roy Powers et al 1 City of Centralia, SE NW NE 21-1n-1e, dry, TD 2,183 ft.

St. Clair County: C. W. Young 1 Hotz, NE SE SE 30-3s-6w, dry, TD 545 ft.

Wayne County: Davis and Johnson 1 E. Draper et al, NE SE SW 9-3s-6e, dry, TD 3,486 ft.

Wheelco Licenses French Firm for Two Products

Wheelco Instruments Co., Chicago, manufacturer of electronic controllers, recorders, and combustion safeguards, has recently signed a licensing agreement with a French instrument manufacturer.

The Wheelco capacitrol, electronic controller, will be manufactured by La Pyrometrie Industrielle, Paris, and the Flame-otrol, combustion safeguard, by its subsidiary, Le Controle de Chauffe, Bagneux, France. Terms of the license permit the distribution of these two Wheelco instruments in France, Spain, and Portugal.

Howard Supply Co. Opens New Warehouse

Announcement of the completion of a new modern steel warehouse in Oakland, Calif., has been made by D. S. Bradbury, vice president in charge of operations for Northern California for Howard Supply Co.

The warehouse was constructed on a tract of industrial property acquired from Santa Fe Railroad Co. Construction of the new warehouse, according to Bradbury, was necessary in order to have sufficient room to stock the many new lines of refinery and industrial supplies that the company has added.

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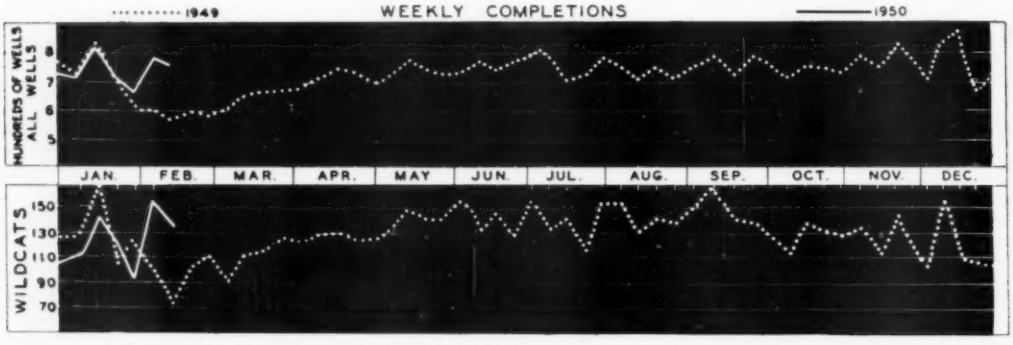
CURRENT STATISTICS

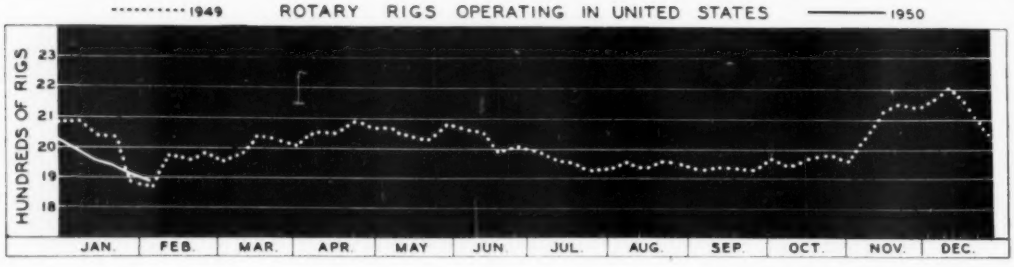
EXPLORATION

WEEKLY WELL COMPLETIONS . . WEEK ENDED FEBRUARY 11, 1950

	Total of all wells					Feb. 11		Wildcat completions and discoveries					Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	13	6	0	*7	17,921	85	124	0	0	0	0	0	0	0	0	0	0
Pennsylvania	20	8	4	*8	33,264	132	216	0	0	0	0	0	0	0	0	0	0
West Virginia	10	2	6	2	21,407	66	65	0	0	0	0	0	0	0	2	1	3
Ohio	19	7	6	6	39,017	103	135	0	0	0	0	0	1	0	0	2	3
Indiana	13	5	1	7	23,444	109	115	1	0	0	1	2	5	0	1	11	17
Kentucky	11	7	0	4	17,813	99	86	0	0	0	2	2	2	0	0	9	11
Illinois	33	20	0	13	62,346	270	233	1	0	0	9	10	4	0	0	59	63
Michigan	19	9	0	10	43,024	92	107	0	0	0	8	8	6	0	0	33	39
Kansas	71	29	7	35	221,666	381	326	3	0	0	8	11	10	0	0	56	66
Neb., Mo., Iowa	2	1	0	1	5,998	9	0	0	0	0	1	1	0	0	0	5	5
Oklahoma	105	65	4	36	394,845	537	391	2	0	0	8	10	16	2	2	64	84
Texas	321	206	10	105	1,397,844	1,772	1,417	5	1	2	58	66	43	5	19	250	317
North Central (Dist. 7-B & 9)	98	49	1	48	322,700	520	432	3	0	1	20	24	13	1	4	76	94
West (Dist. 7-C & 8)	114	94	0	20	608,212	492	308	0	1	0	15	16	12	1	0	56	69
Panhandle (Dist. 10)	17	11	4	2	55,199	155	151	0	0	0	1	1	1	0	2	4	7
Eastern (Dist. 5, 6, & 6-P)	21	11	1	9	86,070	131	77	0	0	0	7	7	2	1	1	28	32
Gulf Coast (Dist. 2 & 3)	41	26	3	12	209,436	245	222	2	0	0	4	6	7	1	3	33	44
Southwest (Dist. 1 & 4)	30	15	1	14	116,227	229	227	0	0	1	11	12	8	1	9	53	71
Louisiana	48	32	4	12	274,223	315	258	1	0	0	3	4	10	4	2	22	38
Northern	27	17	4	6	94,975	167	143	0	0	0	1	1	2	0	0	14	16
Southern	21	15	0	6	179,248	148	115	1	0	0	2	3	8	4	2	8	22
Arkansas	6	1	0	5	22,705	44	19	0	0	0	3	3	0	0	0	14	14
Mississippi	5	1	0	4	39,292	37	38	0	1	0	1	2	0	1	0	8	9
Southeastern States	2	0	0	2	11,945	7	5	0	0	0	2	2	0	0	0	4	4
Montana	2	0	0	2	4,347	18	21	0	0	0	1	1	0	0	0	5	5
Wyoming	10	7	0	3	48,269	78	67	0	0	0	1	1	3	0	0	12	15
Colorado-Utah	2	0	0	2	13,199	17	21	0	0	0	1	1	0	0	0	12	12
New Mexico	10	8	1	1	42,127	86	62	0	0	0	1	1	4	0	0	7	11
California	31	21	0	10	134,521	202	308	0	0	0	9	9	4	0	1	34	39
Dakotas	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
Total United States	753	435	43	275	2,869,217	4,460	4,014	13	2	2	117	134	108	12	27	609	756
Total previous week	793	458	47	288	3,082,836			23	3	8	122	156	95	10	25	492	622
Total February 12, 1949	584	338	55	191	2,257,158			13	1	1	60	75	103	5	18	580	706

Service wells included: *7, *8, 12





DAILY AVERAGE PRODUCTION FOR WEEK

	Feb. 11 crude oil	B. of M. Feb. demand	Feb. 4 crude oil
Alabama	1,750	1,200	1,650
Arkansas	79,700	82,000	79,800
California	867,500	832,000	867,300
Colorado	60,500	67,000	60,500
Eastern	58,600	59,900	60,300
Florida	1,000	1,000	1,050
Illinois	176,700	180,000	180,500
Indiana	27,200	29,000	25,800
Kansas	265,500	290,000	264,500
Kentucky	25,600	24,000	24,900
Louisiana	545,450	542,000	544,075
North Louisiana	119,550		121,550
South Louisiana	425,900		422,525
Michigan	43,200	45,000	44,200
Mississippi	95,750	99,000	99,800
Montana	24,000	25,000	24,500
Nebraska	1,650	700	1,650
New Mexico	130,800	130,000	130,975
Oklahoma	416,400	415,000	410,800
Texas	1,916,500	2,170,000	1,921,850
Dist. 1 (Southwest)	25,625		25,875
Dist. 2 (Southwest)	110,575		111,550
Dist. 4 (Southwest)	178,800		178,550
Dist. 3 (Gulf Coast)	364,625		361,600
Dist. 5 (Eastern)	32,000		32,225
Dist. 6 (Eastern)	80,800		81,075
East Texas field	214,800		217,875
Dist. 7-C (West)	46,900		46,925
Dist. 8 (West)	582,475		578,350
Dist. 7-B (W. Central)	62,000		62,125
Dist. 9 (N. Central)	128,900		135,150
Dist. 10 (Panhandle)	89,000		90,550
Utah	2,500	1,200	2,400
Wyoming	130,100	126,000	132,500
Total United States	*4,870,800	5,120,000	4,879,050
Change from prev. week, down	8,250		
Canada	60,015		60,290

Total U. S. production February 1-February 11 †208,417,720 bbl.
Same period last year (crude plus cond.) 230,993,700 bbl.

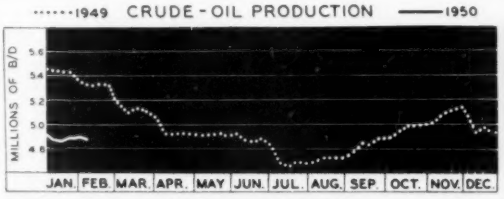
*Not including 93,945 bbl. condensate. †Including 3,850,140 bbl. condensate.

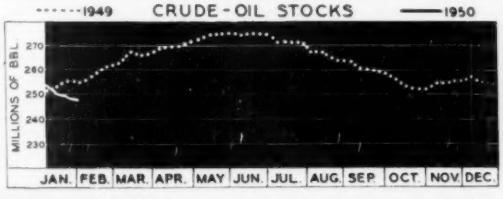
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

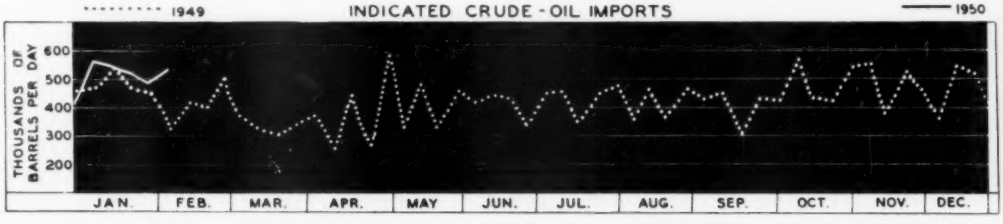
(Thousands of barrels)

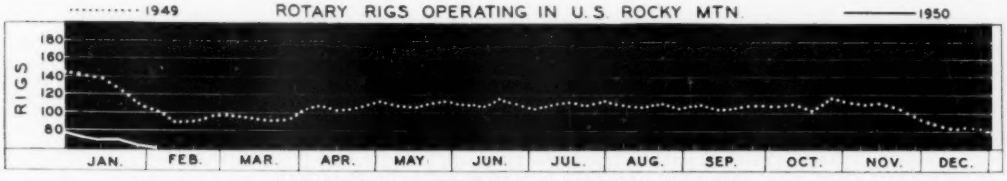
	Feb. 4, 1950	Jan. 28, 1950	Feb. 5, 1949
Pennsylvania Grade	2,726	2,697	2,844
Other Appalachian	1,824	1,890	1,305
Illinois, Indiana, Michigan	11,376	10,798	13,527
Arkansas	3,000	3,150	3,191
Louisiana	14,610	14,351	12,175
North	3,630	3,617	3,228
Gulf	10,980	10,734	8,947
Mississippi	2,529	2,447	2,947
New Mexico	7,171	7,268	6,420
Oklahoma and Kansas	35,722	36,771	35,935
Texas	110,985	110,965	122,587
East Texas	15,029	14,852	15,564
West Texas	38,881	39,675	49,891
Texas Gulf	30,316	29,601	29,471
Other Texas	26,759	26,827	27,661
Rocky Mountain	13,183	13,187	12,643
California	37,334	37,566	32,858
Foreign	7,657	7,321	8,040
Total United States	248,117	248,411	254,472

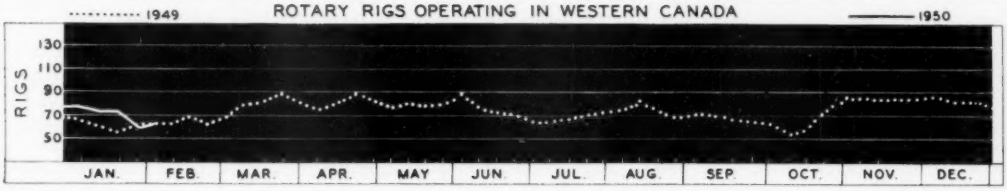
*Bureau of Mines.











A.P.I. REFINERY REPORT. FEBRUARY 4

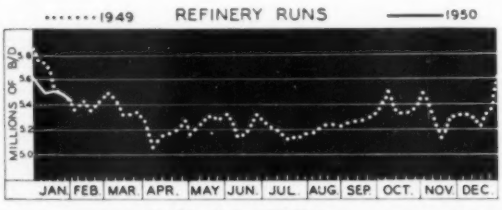
(Thousands of barrels)

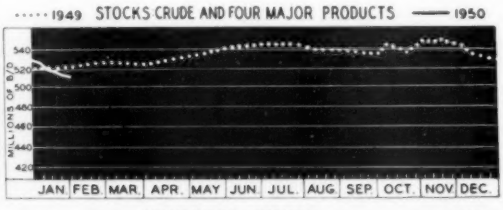
District	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual
East Coast	826	341.7	45.6	198.6	213.1	26,310	8,838	23,087	11,186
Appalachian:									
District 1	88	43.1	7.1	10.6	10.3	2,788	378	641	315
District 2	63	31.9	4.7	6.4	15.1	1,160	104	206	130
Ind., Ill., Ky.	1,016	487.4	76.3	172.6	165.3	26,290	3,145	7,856	3,376
Okla., Kans., Mo.	442	238.7	25.1	84.4	62.7	13,130	720	3,755	1,046
Inland Texas	208	143.1	10.6	24.9	41.7	4,324	331	705	626
Texas Gulf Coast	1,227	585.1	117.6	253.7	202.8	18,863	1,940	11,422	5,648
La. Gulf Coast	427	192.9	50.6	91.6	46.6	6,684	1,322	3,299	2,026
N. La. and Ark.	80	27.3	7.4	11.0	14.0	3,196	259	591	287
Rocky Mountain:									
New Mexico	12	6.4		1.7	2.9	97	25	79	32
Other Rocky Mtn.	172	83.6	5.9	30.4	40.7	4,394	212	1,350	579
California	859	365.9	8.1	162.0	344.9	20,201	821	11,048	29,339
February 4, 1950	5,420	2,547.1	359.0	1,047.9	1,160.1	127,437	18,095	64,039	54,590
January 28, 1950	5,470	2,623.3	383.7	1,043.1	1,198.4	124,270	18,449	66,337	57,036
February 5, 1949	5,441	2,352.0	324.9	1,020.0	1,233.4	117,169	21,107	60,012	61,302

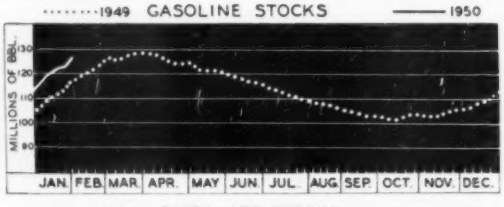
Bureau of Mines, February 1949

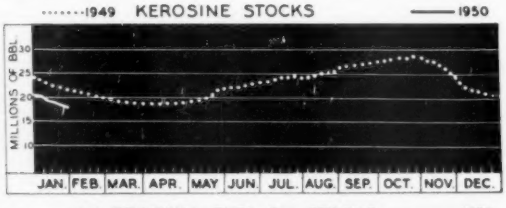
	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
	801	319.6	34.9	162.5	209.2
	99	43.5	6.0	11.8	13.3
	68	33.6	4.8	6.2	17.5
	890	446.5	56.8	142.7	169.0
	436	223.6	26.2	84.8	73.9
	232	151.0	16.9	18.4	54.5
	1,383	616.7	90.6	278.8	243.6
	429	185.1	53.8	99.4	61.9
	72	28.1	9.3	8.0	15.6
	10	5.4	.4	1.3	2.9
	152	66.2	2.9	26.7	39.0
	902	364.2	19.3	163.5	381.9
	5,480	2,483.5	313.9	1,004.1	1,282.3

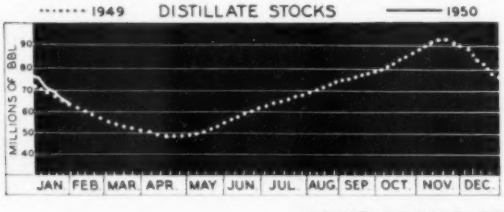
*At refineries including natural blended. †Finished and unfinished.

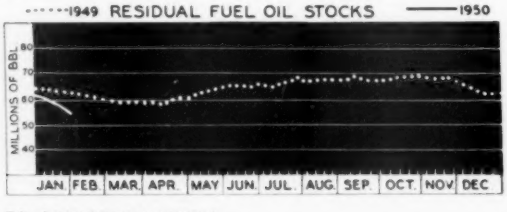


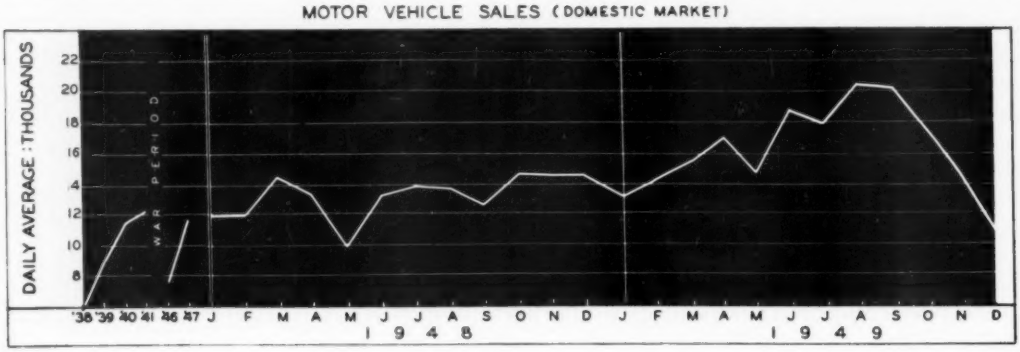











MOTOR VEHICLE SALES (DOMESTIC MARKET)
DAILY AVERAGE : THOUSANDS
WAR PERIOD
'38 '39 40 41 46 47 J F M A M J J A S O N D J F M A M J J A S O N D
1948
1949

CRUDE PRICES
GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.53			
19-19.9	1.63			
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.54
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

EAST COAST kerosine and No. 2 prices continued to weaken to the extent that lower barge prices in New York Harbor are being reflected in tank-wagon quotations. Most of the voluntary discounts off tank-car postings have been replaced by lower posted prices and in some cases new discounts off the new postings have appeared. Spot barge offerings of No. 2 in New York Harbor at 7.6 cents a gallon continue while kerosine in barge lots is available at 9 cents.

The generally posted price for No. 6 residual remains at $2.05 per barrel for barge deliveries in the harbor but there are occasional reports of premium offers for low-sulfur material amounting to 5 or 10 cents a barrel. Some marketers report less interest in the East Coast market on the part of California suppliers. On the other hand, imports of heavy fuel in December set a new record.

Several suppliers in the Mid-Continent area reported improvement in the "dirty" tank-car situation but indicated that the increase in number of cars available was due to the shortage of heavy fuel for shipment rather than a decrease in demand. With most suppliers down to shipments out of production, spot-market sales have been very low.

Kerosine and No. 2 prices have remained firm in the Mid-Continent area with "clean" cars still scarce.

Natural gasoline markets have become increasingly soft over the past few weeks, particularly in North Texas. Sales of Grade 26-70 in the North Texas area were reported at 5 cents a gallon resulting in a similar reduction of $\frac{3}{8}$ cent for Group 3. Some material may be moving at the old prices, but most suppliers feel that the market will stabilize at the new level this week.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of February 13, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	$9\frac{3}{8}$-$9\frac{7}{8}$	10.5-11.1	9-$9\frac{3}{4}$
Premium gasoline, 78-80 octane	$10\frac{3}{8}$-$10\frac{7}{8}$	11.5-12.1	$9\frac{3}{4}$-$10\frac{3}{4}$
42-44 w.w. kerosine	$8\frac{1}{2}$-$8\frac{3}{4}$	9-9.1	8-$8\frac{1}{2}$
No. 2 straw fuel oil	$7\frac{5}{8}$-$7\frac{7}{8}$	7.6-7.9	$6\frac{3}{4}$-$7\frac{1}{4}$
No. 6 residual	$1.45-1.55	$2.05	$1.65-1.75

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	$5\frac{1}{2}$	5	$5\frac{1}{4}$
Grade 18-55	6.6	6	6.3

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	17
200 vis., No. 3 neutral, 0-10 pp.	11.5-13

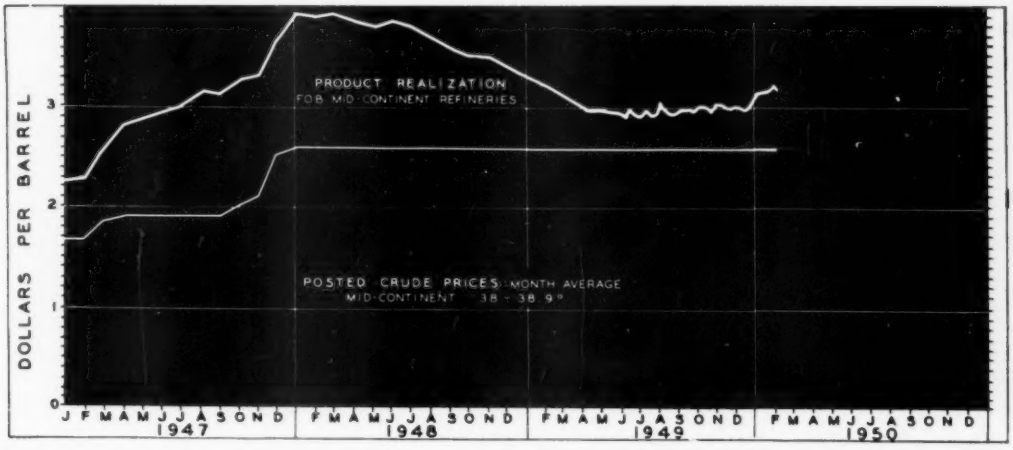
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5-20.5
180 vis., 0 p.t. neutral	20.5-21.5

WAX

Mid-Continent

132-134 A.M.P.	4.25


DOLLARS PER BARREL
3
2
1
0
PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES 1-MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1947
J F M A M J J A S O N D
1948
J F M A M J J A S O N D
1949
J F M A M J J A S O N D
1950

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

Permian Basin

(Continued from page 150)

TD 5,532 ft., elev. 2,063 ft., Capps 4,569 ft., Caddo 5,242 ft., Ellenburger 5,400 ft.

Schleicher County: Delaware Drillers, Inc., and J. Ralph Stewart 1 Mrs. Sadie Weddell, SE SW 84-H-GH&SA, ½ mi. NE Phillips 1 Weddell, Strawn discovery; dry, TD 6,194 ft., elev. 2,373 ft., Canyon reef 4,652 ft., Strawn 5,446 ft., Ellenburger 5,920 ft.

Scurry County: American Republics Corp. 1 Don C. Sivalls, SW NE 34-3-H&GN, 3½ mi. W Hermleigh, 8 mi. SW Baxter 1 Feldman, dry, TD 7,877 ft., elev. 2,389 ft., San Andres 1,453 ft., Clear Fork 2,330 ft., Wolfcamp 4,113 ft., Strawn 7,205 ft., Ellenburger 7,708 ft.

Fred T. Jester 1 Browning & Scott, NW SW NW 124-3-H&GN, within Snyder townsite, east side; dry TD 7,400 ft., elev. 2,355 ft., top lime 7,150 ft., porosity 7,164 ft.

R. W. Sutton 1 M. H. Thornburg, 77-3-H&GN, 1 mi. S outpost of SE side N Snyder field, dry, TD 7,825 ft., elev. 2,452 ft., reef 6,812 ft., lime 7,054 ft.

Sterling County: William Hamm, Jr. 1 Ellwood Estate, 33-15-SPRR, NE corner of county; dry, TD 7,599 ft., elev. 2,075 ft., Ellenburger chert 7,315 ft., dolomite 7,444 ft.

Upton County: Humble Oil & Refining Co. 1 Mrs. Z. Oswalt, 12-B-CCSD&RGNG, 4½ mi. NW Benedum field, dry, TD 12,732 ft., elev. 2,723 ft., anhydrite 1,365 ft., Grayburg 3,852 ft., San Andres 3,930 ft., Wolfcamp 8,530 ft., Strawn 10,125 ft., Devonian 11,035 ft., Silurian shale 11,410 ft., Montoya 11,590 ft., Simpson 11,655 ft., Ellenburger 11,908 ft.

SOUTHEASTERN NEW MEXICO

HOBBS—Plains Production Co. 1 S. C. Scarbrough, SE NW 24-26s-37e, Lea County, discovery or 2-mile south extension to Queen sand production in Dublin field, flowed 117 bbl. of oil in 8 hours, then made 375 bbl. of oil, without acid, in 24 hours. Total depth was 3,440 ft. Top of the sand was not reported.

The well kicked off and blew the tools up the hole and operators spent several days getting the hole in condition. When it was cleaned out to 3,422 ft., tubing was run and the 375-bbl. flow was made without chokes. At last report it was shut down for storage and connections.

Location is 10 miles southeast of Jal and 15 miles north of Kermit, in Winkler County, Texas. With the exception of Dublin field, north of the discovery, nearby fields produce from the Yates section of the Permian. These fields include Scarborough field along the north line of Winkler County and Rhodes pool, 2 miles west of the discovery. On elevation of 2,992 ft., the 1 Scarborough topped the Yates at 2,600 ft.

Gulf Oil Corp. 11 La Munyon, NE NW 27-23s-37e, edge well in Teague field, was testing in the Ellenburger dolomite. Cores from 9,757-68 ft. recovered dolomite with scattered to good stains; from 9,768-72 ft. the recovery was the same with some bleeding oil. A 90-minute drill-stem test from 9,757-72 ft. recovered 60 ft. of oil and gas-cut mud. Shut-in pressure was 3,800 psi. A second test from 9,770-84 ft., open 3 hours, had gas in 9 minutes, at the rate of 170,000 cu. ft. daily; oil in 1 hour and 58 minutes which flowed 18 bbl. in 1 hour with gas that increased to 360,000 cu. ft. Flowing pressure was 1,500 psi. and shut-in pressure was 4,050 psi. Recovery in the pipe was 2,000 ft. of oil.

Stanolind Oil & Gas Co. 1 S. C. Bilberry, north extension attempt to House pool in SW NW 6-20s-39e, perforated 32 shots from 7,130-38 ft. and flowed 88 bbl. of oil plus 271 bbl. of salt water in 24 hours through ¼-in. choke. With retainer at 7,125 ft., 40 shots were placed from 7,104-14 ft. for further tests.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Lea County: Shamrock Oil & Gas Corp. 1 State, SE SE NE 31-21s-34e, 4 mi. S Lynch field, dry, TD 4,010 ft., elev. 3,699 ft., base salt 3,770 ft., no shows.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURE

Randall County: Al Slessman et al 1 George Nance, 1,320 ft. from S and E lines, 138-6-I&GN, 8 mi. E SE Canyon, dry, TD 7,481 ft., elev. 3,628 ft., top Panhandle lime 2,440 ft.

N. Central Texas

(Continued from page 163)

J. C. Jennings 1 J. R. Sloan, Jr., Sec. 2,770, Texas Emigration Co. Sur., 4 mi. N Jermyn, dry, TD 4,400 ft.

Jones County: G. M. Gillespie 1 H. Nunneley, Sec. 45, OAL Sur., 6½ mi. E SE Anson, dry, TD 2,960 ft.

Montague County: Kingwood Oil Co. 1 Cora Yates, Blk. 3, Hunt CSL, A-1, 6 mi. NE Alvord, dry, TD 8,177 ft.

Standard Oil Co. of Texas and Reno Oil Co. 1 Cato Heirs, F. Robertson Sur., A-620, 4 mi. NW Spanish Fort, dry, TD 3,070 ft., elev. 775 ft.

Wichita County: Ted A. Norwood 1 E. J. Hawkins, John Thomas Sur., A-283, 3 mi. E Iowa Park, dry, TD 3,255 ft.

E. E. Reynolds 1 Blanche Hall, GC&SF Sur., A-603, 5½ mi. NW Iowa Park, dry, TD 2,000 ft.

Wise County: A. R. Dillard 1 J. B. Smith, Sec. 1, Falls CSL, A-293, 1¾ mi. SW Park Springs, dry, TD 6,127 ft.

Young County: Fortex Oil Corp. 1 C. B. Hockaday Est., B. Hill Sur., A-144, 3 mi. S Graham, dry, TD 3,650 ft.

Virgil Taylor 2 Hutchinson, Sec. 232, TE&L Sur., 425 ft. SE 1, 1 mi. E Olney, dry, TD 1,029 ft., Gunsight lime 1,014-14 ft., sand with oil show 1,027-29 ft.

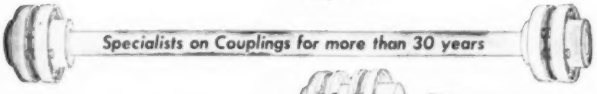
L. A. Warren Drilling Co. 1 Sidney Hunt, Sec. 178, TE&L Sur., 4 mi. SW Olney, dry, TD 1,091 ft.

THOMAS Flexible ALL METAL COUPLINGS

FOR POWER TRANSMISSION • REQUIRE NO MAINTENANCE

REFINERS! PIPE LINE MEN!
DRILLING ENGINEERS!
LABORATORY TECHNICIANS!

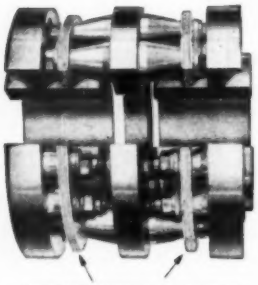
All can use Thomas Couplings to their advantage on Pumps, Compressors, Cooling Towers, Rigs or any tough job where continuous operation and dependability are required.



Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

BACKLASH FRICTION WEAR and CROSS-PULL are eliminated
Lubrication is not required!



PATENTED FLEXIBLE DISC RINGS

THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

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NO MAINTENANCE PROBLEMS.

• • •

ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

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EQUIPMENT MEN . . . in the News

Telecomputing Service Available to Industry

W. W. BEMAN

An engineering and computing service is now available to the oil industry through Telecomputing Corp., of Burbank, Calif., directed by Ward W. Beman. This engineering computing service combines the experience of research engineering with the speed and accuracy of electronic computing machines.

Telecomputing engineers take complex or lengthy problems and formulate them for automatic solution. Electronic machines find trigonometric functions, logarithms, and exponentials with the same facility and speed with which elementary arithmetical operations are performed.

Iterative solutions in the design of fractionating columns and numerical solution of differential equations in the fluid-flow problems of oil-well pumping are examples of mathematical processes well adapted to solution by Telecomputing techniques.

Also available are specially designed machines which read and transcribe graphs, oscillographic, and film records. Currently under development is a high-speed automatic data-plotting machine.

Rockwell Moves Instrument Facilities to Tulsa

Rockwell Manufacturing Co. has moved the main part of its instrument-manufacturing facilities from Pittsburgh to its Maenick Division in Tulsa. The products involved are the orifice meter, integrator, and related parts.

The orifice meter will measure accurately over a wide range of pressures and volumes. The integrator is a development in measurement equipment which presents a method for accurately calculating the results from orifice meter chart records.

Rockwell officials state that the move was in keeping with the company's policy to have products manufactured as close to the market as possible when other factors relating to manufacturing make it practical to do so.

McAnally and Hughes Join United Supply

V. P. McANALLY

ALLEN HUGHES

Two important positions have been filled in United Supply & Manufacturing Co., H. B. Gutelius, president of the firm announced.

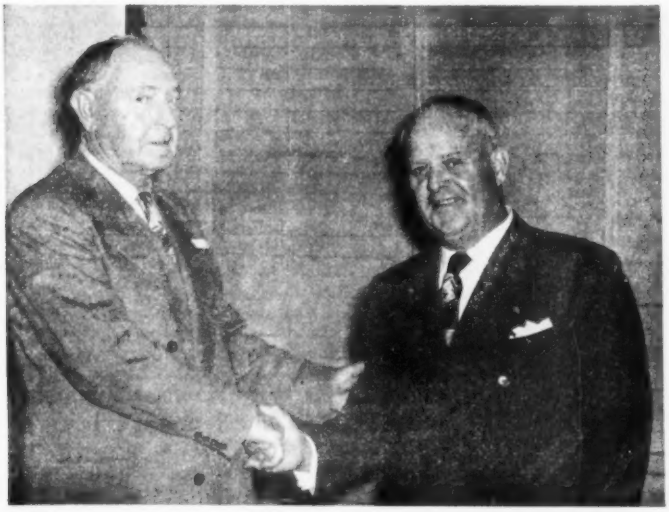
V. P. McAnally has been appointed district manager of Kansas and Allen Hughes has been appointed city salesman for the Houston office. Hughes had previously been with Republic Supply Co. McAnally, a veteran with the oil-field-supply business, was with Bovaird Supply Co. for 23 years before joining United. He will headquarter in Wichita.

Walker on Latin-American Trip for Lane-Wells

J. Murray Walker, export sales engineer with Lane-Wells Co., is making an extensive trip through most of the South American countries and Mexico. During his 2-month tour Walker will spend considerable time with the oil-industry personnel of each country acquainting them with the services and products offered by Lane-Wells.

Walker joined Lane-Wells in 1937. He has served in both the operations and sales departments of the company. He spent 3 years in Canada as manager of the Lane-Wells Canadian branch. Prior to accepting his present position a year ago, Walker was division sales engineer at Tulsa.

H. J. Paschall Is Named H. C. Smith Export Manager



H. C. Smith, president, H. C. Smith Oil Tool Co., congratulates Hearn J. Paschall upon the appointment of Paschall as export manager of the firm, with headquarters at the company's main office and plant at Compton, Calif. Paschall was formerly associate representative covering South American oil fields.

Brooks Resigns as Manager Of Atlas Supply Division

J. R. (Dick) Brooks resigned February 1 as manager of Atlas Supply Division of Jones & Laughlin Supply Co., at Muskogee, Okla. Brooks started in the oil-supply business at Casey, Ill., with Bovaird & Seyfang

in 1905, going later to Bartlesville and finally to Muskogee, where he has been since 1920.

The western stores of Bovaird & Seyfang were taken over by Atlas in 1910, and Brooks eventually rose to the position of vice president and general manager of Atlas, a position he held until May 1944, when Jones & Laughlin Supply Co. purchased Atlas Supply.

Paul Joins Glass Fibers As President's Assistant

H. W. PAUL

Hugh W. Paul has joined Glass Fibers, Inc., Waterville, Ohio, as special assistant to the president, according to an announcement by R. H. Barnard, president.

Paul's previous experience was with Owens-Illinois Glass Co. for 13 years in various administrative and sales capacities, most recently as vice president of American Structural Products, an Owens-Illinois subsidiary.

Johnson to Manage National Supply Store at Ringwood

National Supply Co. has opened a store at Ringwood, Okla., under the direct supervision of W. M. Jones of Oklahoma City, district manager for National Supply.

R. L. Johnson, formerly manager of the company's Lindsay store, has been appointed store manager at Ringwood. Ralph F. Blair, formerly at the firm's Oklahoma City store, is Ringwood's field sales representative. W. D. McNamara, formerly associated with the firm's Seminole store, has also been transferred to the Ringwood store.

Vinson Supply Leads Fisher Governor Sales

Vinson Supply Co., whose home offices are located in Tulsa, and with branch offices in Dallas and Odessa, Tex., and sales offices in Lubbock, Tex., and Oklahoma City, was first in the nation in sales for Fisher Governor Co. for the year 1949.

B. W. Vinson, president of Vinson, said: "This gives some indication of the importance that Tulsa has in the oil industry, for there are Fisher distributors located in New York, Houston, Los Angeles, and other manufacturing centers throughout the nation."

Cooper and Johnson Get New Kaiser Steel Posts

Appointment of Charles F. Cooper as assistant sales manager of the Central district and of L. G. Johnson as manager of the new Houston sales office, has been announced by Kaiser Steel Corp.

Cooper, who joined the Kaiser organization in 1942, will assist N. H. Balaam, district sales manager. The district covers northern California, southern Oregon, Idaho, Utah, Montana, and Nevada.

The new Kaiser sales office in Houston, opened to handle the company's sales of steel line pipe in the Southwest, is located in the M & M Building.

Suppliers Association Plans March Meeting

The board of directors, Pacific division, Petroleum Equipment Suppliers Association has decided to hold a membership meeting in Los Angeles on March 9, preceding the general association membership meeting being held this year at White Sulphur Springs, W. Va.

T. Sutter, chairman of the board, has appointed Hugh Glen, Jack Pike, and Warner Parker to assist him with details.

It is the desire of the board that several representatives from each member firm attend, including executives and department heads interested in the association's activities.

Production Specialties Made Agent for Rolo

LEE FLOOD

Production Specialties Co., of Midland, Tex., has been named engineering sales and service representatives for Rolo Manufacturing Co. of Houston, in West Texas and New Mexico, according to an announcement by Lee Flood, owner of the Midland company.

Production Specialties was formed early in 1949 for the purpose of providing equipment and techniques to answer special problems that arise in the production of oil and gas, and in general to aid in more efficient production practices.

"As part of Production Specialties' broad objective, there is need for more accurate measurement of the volumes of fluids produced from the reservoir," said Flood. "Rolo equipment is being used effectively in an increasing number of installations, both portable and permanent, to provide for the measurement of well fluids by metering in lieu of more costly installations of test separators and tanks."

Flood was graduated as an engineer from Leland Stanford University in 1930. His life-long association with the oil industry includes a 10-year tour of duty with Natural Gas Pipeline Co. of America, and an editorship of Petroleum Engineer magazine in Dallas. Just prior to forming Production Specialties Co., Flood served as chief engineer for the Goldsmith Pool Engineering Committee in Midland.

Hercules Names Ethriedge As Field Representative

S. P. Tschappat, president, Hercules Tool Co., Tulsa, has announced the appointment of A. (Archie) L. Ethriedge as field representative for Oklahoma. Formerly he was associated with Axelson Manufacturing Co. as a field salesman with headquarters in Shreveport.

Houston Nomads Entertain Foreign Guests

Foreign visitors attending the January meeting of Houston Nomads are: D. V. Smith, Reynosa, Mexico; W. D. Koonze, Bogota, Colombia; T. R. Whittaker, Anglo-Saxon Oil Co., London; W. J. Nifelt, N. V. De Bataafsche Petroleum Maatschappij, The Hague, Holland; Helmy Elmasri, Anglo-Egyptian Oilfields, Ltd., Cairo, Egypt; C. R. Summers, Caracas, Venezuela; and O. L. Nuernberger, awaiting a new assignment to South American oil fields.

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EQUIPMENT FOR SALE

ROLAGRIP COUPLINGS—For Sale. Approximately 40 tons, $1^1/_2$" to $3^1/_2$" Line Pipe Size. New, never used, complete with nuts, bolts and neoprene gaskets. Price 50¢ less than manufacturers selling price. Send for list. JULIUS M. FOGELMAN, Reading, Pa.

FOR SALE OR LEASE: Heavy duty oil well cementing truck. Equipment includes two 5 x 10 pumps. For details write Fred R. Holland, Box 3844, Odessa, Texas.

FOR SALE: 1—36-L Bucyrus Rig, 1948 model, complete with all tools. Phone 2032, Henderson, Kentucky.

FOR SALE: One Wilson Mogul Double Drum rig, complete with 98' L.C. Moore derrick and 14" Bethlehem pump. In excellent repair, drilling capacity 6,000'. Will sell with or without 4,000' $3^1/_2$" modified drill pipe. Priced for immediate delivery $52,000.00, subject to prior sale. Mack Well Servicing Company, P. O. Box 29, Alice, Texas.

FOR SALE: Used Cooper Skid Model E well servicing unit, mounted on 6X6 GMC with new motor and good rubber. With or without 8 X 10 X 60 ft. mast and tools. Unit located at Seminole, Okla., Box D-388, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

New and Used 48-L, 36-L, 26-L, 24-L, 22-W and 21-W Bucyrus-Erie Drills.

BEACON SUPPLY CO.
Box 398 Pampa, Texas Phone 3377

FOR SALE

4—250 bbl. 4—500 bbl. low type
4—1,000 bbl. high type 4—1,500 bbl.
3— 5,000 bbl. 5—10,000 bbl.

All NEW closed A.P.I. bolted type steel tanks

4—NEW closed welded steel tanks 7'6" dia. x 13'6" long, $^3/_8$" shell, $^3/_4$" bulged heads

3—NEW vertical welded steel tanks with welded stands, 4'8" dia. x 18'8" high, $1^1/_2$" thickness, bulged heads

16—Used horizontal welded steel tanks 8' dia. x 30' long, $^1/_4$" thickness, approx. 12,000 gal.

20—Used vertical welded steel tanks, like glass enameled inside, 10'4" dia. x 17'4" high, $^3/_8$" shell, dished heads

100—Used closed vertical Cypress WOOD tanks, approx. 10' diameter, from 8' to 18' high, complete with round hoops and lugs

We carry large quantities in stock for immediate shipment of New and Guaranteed Used steel PIPE and TUBING up to 30" in diameter.

Your inquiries will be appreciated.

A. GREENSPON PIPE CO., Inc.
3615 Olive St. St. Louis 8, Mo.
LUcas 5651

EQUIPMENT FOR SALE

FOR SALE: Two steel mud tanks, 5 feet by 8 feet; 30 feet long, made of $^1/_4$" steel, sloping bottom. Never been used. $3200. Located Makin Drilling Company's yard, Hobbs, New Mexico.

ONE Skid mounted 5 x 10 Gardner Denver Pump with 525 Buda Engine used to drill five shallow holes—$3000.00. Riverside-6811, Dallas, Texas.

FOR SALE: One Star A-83 Speedster in excellent condition. For information, call Carl A. Lesh, Hart, Michigan, or D. B. Lesh Drilling Company, St. Elmo, Illinois.

FOR SALE, south of Wewoka in the Fish Pool: 21,000' of 4" OD boiler flue oil line. 15 cents per foot as is. 25 cents per foot taken up. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINE. E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

NEW casing, 936 ft. $5^1/_4$-15 lb. J55-Range 1—$1.20; 30 ft. $9^5/_8$-36 lb. J55—$2.91. In Houston yard. Sharp Oil Corp., Box 707. Phone Justin 6480, Houston, Texas.

FOR SALE—HYDRAULIC CASING PULLING MACHINE
Mounted on 1947, $1^1/_2$ Ton Dodge Truck —complete unit to pull $5^1/_2$"-7" O.D.— $8^5/_8$" and $10^3/_4$" Casing. Gin poles—steel dog house. Rex centrifugal pump and all necessary tools.
J. F. SMITH
Phone L.D. 33
302 Masonic Building Shawnee, Okla.

TANKS

3—Wyatt 10,000-Bbl. Welded Steel, 45' x 35' 7", cut down, match marked, complete W 8" vent and flame arrestor, ladder, nozzles, etc., excellent condition.

Location: Alice, Texas
Price: $6,000.00 each

Purchasing Department
SOUTHERN MINERALS CORP.
P. O. Box 716, Corpus Christi, Texas

EQUIPMENT FOR SALE

Fort Worth Spudder, Model H with all tools good condition.

Le Roi Air Compressor 60 on rubber used 60 days, guaranteed A-1 condition. Jack hammer and paving breaker with air hose.

Kwik-Mix Concrete mixer 6-S on rubber used 90 days, guaranteed A-1 Condition.

All priced to sell.

UNITED CONTRACTING CO.
Box 7098 Phone 8-3296
Fort Worth, Texas

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE at Hobbs, N. M.: 1—Used Allis Chalmers Model UM-4 Skid Well Servicing Unit, $1350.00. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE at our Barnsdall warehouse: 665' 13" OD 50# used Lapweld Casing, $2.25 per foot, take all. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: One D-13000 Caterpillar, Diesel engine. Extra good condition, only 2000 hours operation. The Ramsey Petroleum Company. Attention: J. H. Wagner, El Dorado, Kansas.

HIGH PRESSURE PIPE
31,600'—7" OD 27.73# Seamless Range 2, Beveled, Excellent Condition.
Location: Alice, Texas
Price: $1.75 Foot
Purchasing Department
SOUTHERN MINERALS CORP.
P. O. Box 716, Corpus Christi, Texas

STEEL STORAGE TANKS

Railroad Tank Car Tanks, 6,500 to 12,000-Gal. Cap. Coiled and Non-Coiled.

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PRESSURE VESSELS
Description and Price

1—Debutanizer, J. B. Beaird, 30" x 63', 36 removable trays, 150 psig. working pressure. $1,260.00
1—Secondary Still, J. B. Beaird, 36"-x 54', 20 removable trays, 50 psig. working pressure. $1,150.00
1—Reabsorber, J. B. Beaird, 36" x 41', 22 removable trays, 90 psig. working pressure. $1,075.00
2—Absorbers, Tulsa Boiler, 84" x 45', 16 fixed trays, one double mist extractor, 80 psig. working pressure. Each $2,500.00
2—Scrubbers, Tulsa Boiler, 84" x 10', one double mist extractor, 80 psig. working pressure. Each $550.00

All above in excellent condition.
Location: First three items — Alice, Texas. Last two items—Bishop, Texas.

Purchasing Department
SOUTHERN MINERALS CORP.
P. O. Box 716, Corpus Christi, Texas

EQUIPMENT FOR SALE

FOR SALE: Approximately 15,000 feet of 6" OD "Invasion" Steel Pipe. Wt. about 9#, 6⅝" OD Plain Ends, 20' lengths. New condition. Also, approximately 15,000 feet of 6⅝" OD Plain End Stand Black Steel Pipe, No. 2 Grade. M. KAPLAN & SON, Box 1883, Phone 942, Monroe, Louisiana.

WICHITA (50) Spudder complete with Hercules engine, lines—tools—light plant—reamers—pipe sufficient for 2500 foot well. F. E. Hunt, Adair, Iowa.

EVEREDY FILLER FOR SALE—Four-piston Everedy Grease Filler, formerly used by Socony; capacity 2500-9500 containers per hr. on 1-5 lbs.; 1200-4500 containers per hr. on 6-10 lbs.; 800-3000 containers per hr. on 11-25 lbs.; 600-2400 containers per hr. on 26-34 lbs.; the machine sells new today approximately $4,000; offered subject to prior sale only at considerably less than 50% off; Also, 10—3000 gal. steel tanks; ¼" plate, dished heads, manholes; miscellaneous bottling equipment, including fillers, labelers, screwcappers, etc. What are your requirements; what surplus equipment do you have for sale? Chas. S. Jacobowitz Co., 3080 Main St., Buffalo 14, N.Y. U.S.A. Telephone—AMherst 2100.

FOR SALE: 3200 ft. of 5½"-22# Range 2 Drill Pipe with Reed Shrink grip, Full Hole Tool Joints. Pipe & Joints in excellent condition—priced right to sell. 2—110 HP 250# oil well Locomotive type steam boilers. Boilers practically new, used only a short time. Boilers can be operated at full pressure under any state or insurance regulation—priced right to sell. 9000' 2"—11½ thd. Regular long range 1 Seamless tubing 4.60# —37c per foot, FOB Pampa. P. O. Box 1517, Phone 3957, Pampa, Texas.

FOR SALE
100 KW. Generator Set—General Motors Series 71—Twin 6 Motors—with 100 KW. Generator—complete with exciter, voltage regulator, etc. Run 200 hours since complete overhaul. Also Caterpillar D-8800 Power Unit completely rebuilt.
MARTIN TRACTOR CO.
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ON ALL ITEMS FROM
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Tanks, towers and vessels.
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of Washington
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COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

EQUIPMENT FOR SALE

SEISMOGRAPH EQUIPMENT FOR SALE: Two 2-Ton Chevrolet Coleman 4-Wheel Drive water trucks. 500 gallon tank completely winterized, vacuum fill, Tulsa winch, etc. Excellent condition, low mileage. Original Cost $6600.00—Sale Price $4000.00.

One ½-Ton Chevrolet crew and field service unit. Bed enclosed with steel, cab with heater, 65 gallon gas tank with gear pump. 7:50 x 15 tires. Low mileage. Original Cost $2800.00—Sale Price $1800.00. Riverside-6811, Dallas, Texas.

FOR SALE: 1—Fairbanks Morse—Model BE 24 Diesel Engine 150 H.P. twin cylinder horizontal. 1—Set National Transit Reciprocating hot oil pump size 5¼ x 18 H.D.O.P. for diesel engine drive. 1—Set Worthington simplex steam reciprocating hot oil pumps, size 24 x 5 x 24. All of the above may be inspected on Pana Refining Co. location at Pana, Illinois. All in operating condition.

UNION Hot Oil Pump—24 x 44 x 45⅝ x 24 cross compound crank-and-flywheel plunger type. Good condition. Serial No. 200999. Suitable for 1,000 PSI discharge pressure at 700° F. Stainless metallized plungers. You may inspect at any time. Make offer, F.O.B. Cheyenne. The Frontier Refining Company, P. O. Box 418, Cheyenne, Wyoming.

FOR SALE: 1—Cardwell K Double Drum Unit unitized with GAK Waukesha. 1—7¼ x 18 Model 7P Wilson-Snyder Pump. 1—7¼ x 12 Clark Triplex Pump. 1—7¼ x 10 Model EE-PXD Gardner-Denver Pump. 1—4 x 6 Fig. 6161-A Fairbanks-Morse Pump. 1—13⅜ x 3 Union Triplex Glycol Pump. 2—D13000 Caterpillar Diesel Engines. 2—PA100 International Engines. 1—75⅛ x 8¾ Hughes Type J Core Barrel. 1—A250 Bethlehem Crown Block. 1—Deckard Monkey Board for 136'-30' Base Derrick. 1—Hunt Tool Monkey Board for 125'-24' Base Derrick. 1—13⅜ SDA Cameron Blowout Preventer c/w 13⅜ Pressure Operated Gate Valve. 1—Set (2) 7'4" wide x 10' high x 21' long Substructure c/w walkways, handrails, and steps. 1—Type B-6 Emsco Swivel. 10—5¼" OD x 30' Drill Collars in tandem of 5 each. 3—5" OD x 26' Drill Collars. 1—24" x 48" Link Belt Mud Screen c/w Model AEH Wisconsin Motor.
All equipment completely overhauled.
M. ROSENBLOOM PIPE & SUPPLY CO., INC.
P. O. Box 1328 Phone 4-2601
Shreveport, Louisiana
Specializing in Drilling Equipment

FOR SALE: At our Pampa Gasoline Plant —1-4' O.D. x 40' long, Propane Storage Tank. Code Vessel 200# at 250° F. Price $750.00 new 1940. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE: We are taking up in the Fish Pool south of Wewoka, a large quantity of 2", 3", and 4" line pipe. All should be available within 30 days. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

WAR SURPLUS MACHINERY
Gaso, Byron Jackson, Aurora, Wayne, Lombard, & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.
H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

VALVES

7—6"	Merco-Nordstrom Plug Valves, Fig. No. 18849 (3049). Each	$525.00
2—8"	Merco-Nordstrom Plug Valves, Fig. No. 18849 (3049). Each	$330.00

All above in good condition.
Location: Alice, Texas
Purchasing Department
SOUTHERN MINERALS CORP.
P. O. Box 716, Corpus Christi, Texas

EQUIPMENT FOR SALE

FOR SALE: 3 New 10,000 bbl. A.P.I. Columbian Bolted Steel Tanks. 160—8000 & 10,000 Gal. Tank Cars. Darien Corp., 60 E 42nd St., N. Y., N. Y.

EQUIPMENT WANTED

WANTED: COMPLETE 2#6 Baker, cable tool, coring barrel. Write condition, location and price: Williams Oil Co., 915 South Main, Ottawa, Kansas.

WANTED: Core drilling Rig with complete outfit drill pipe tools and water Truck. Failing 1500 or equal size. T. R. Davis, 700 Mosley St., Vidalia, Georgia.

WANTED: Late model drilling rig capable of drilling 8500 feet complete with portable derrick, drill pipe, blowout preventer, hydromatic brake, all necessary tools and accessories. Must be in A-1 condition. Cash transaction. Box D-386, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Two Failing 1500' Core Drills or Failing 44s. West Drilling Company, Athens, Texas.

HELP WANTED

JUNIOR ENGINEER wanted by independent oil company operating in West and West Central Texas. Must be recent graduate with petroleum engineering degree. All replies should contain outline of training, past experience, if any, age, marital status, date of availability, and starting salary desired. Recent photo or snapshot would be helpful. Address Box D-342, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Design Engineer. Graduate Mechanical Engineer with experience in design of pumps, meters, controls and/or allied equipment used in petroleum industry. Age: 30 to 40 years. Excellent opportunity with well established firm. Inquiry confidential. Reply giving full particulars to Box D-382, The Oil and Gas Journal, Tulsa, Oklahoma.

HIGH type, responsible executive wanted as Manager Latin-American operations for substantial independent producing company entering foreign operations. Applicant should be college graduate, under 40 years of age; have minimum 15 years' experience in production and drilling work, particularly in high pressure oil and gas well completions. Applicant should speak Spanish fluently, have thorough experience in development Geology, be equipped to prepare and maintain adequate reservoir and engineering studies including repressuring and pressure maintenance. Excellent compensation. When replying, give full details. Our present employes not considered for this position. Box D-364, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Mechanical design engineer and draftsman with minimum three years' experience oil refinery piping engineering. Engineering degree preferred. Permanent positions for qualified men. Give complete review experience record with application. Address E. M. Skinner, Chief Engineer, Socony-Vacuum Oil Co., Inc., Augusta, Kansas.

FOREIGN and Domestic Oil Employment Directory (including late supplement of oil companies and drilling contractors in Western Canada). Over 500 listings in drilling production, refinery, natural gasoline, pipelines, geological, exploration, supplies, manufacturers, services and refinery and pipeline contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 30th year.)

HELP WANTED, SALESMAN: We want a man interested in adding several thousand dollars to his yearly income. He must be well established in the oil country trade in Houston. He should have other supporting lines that would be non-conflicting with electric motors and controls. We prefer a man over thirty, married, and with better than a high school education. If interested, give complete information in first letter. Reply to: Box D-384, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Engineer with experience in core analysis to supervise routine laboratory and research work and interpret routine results. Advanced degree preferred. Salary open. State experience, education, and salary expected. Continental Oil Company, Personnel Division, Ponca City, Oklahoma.

HELP WANTED

EXPERIENCED gravity personnel for foreign work, party chiefs, surveyors, and operators. All expenses. The best opportunity in the industry to make money and advance. Exploration Surveys, Inc., 5615 Daniels Avenue, Dallas 6, Texas.

WANTED: Instrument man with experience in oil refinery and chemical plant instruments. Denver location. State age, experience, and salary expected, in first letter. Box D-373, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES AGENT wanted by well established Oil and Gas production equipment manufacturer. Three territories available (1) Illinois, Indiana, Michigan and Ohio, (2) Texas Panhandle and North New Mexico, (3) South Texas. These territories offerred on exclusive contract to capable man on commission basis. Prefer Graduate Mechanical or Petroleum Engineer with five to ten years field or selling experience. Line of equipment includes Oil and Gas Separators, Wellcheckers, Free Water Knockouts, oil, water, and gas meters, Liquid Level Controls, Pressure Regulators, Chemical Pumps, and other items. Reply Box D-376, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

SITUATIONS WANTED

CHEMICAL ENGINEER: Three years' experience process engineering and operations technology, catalytic cracking, absorbtion, crude running. Seeking position as process engineer and/or operations technologist, refinery engineer. Age 28, family. Box D-366, The Oil and Gas Jouranl, Tulsa, Oklahoma.

GRADUATE petroleum and geological engineer, 25, desires position home or abroad. Excellent references. Box D-369, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: B.S. degree. Experience in West Texas, New Mexico, North Central Texas, Mid-Continent area, and Illinois, desires position with aggressive company. P. O. Box 183, Tulsa, Oklahoma.

DESIRES CHANGE: Refining and Production Material Man. Experienced in Auditing, Inventory, Control, Purchasing and Sales. Can furnish the best of references. Age 35. Box D-302, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

MECHANICAL Designer—machines, tools, products, development work, top hand. Available soon. Write Box D-375, The Oil and Gas Journal, Tulsa, Okla.

ACCOUNTANT—MBA Degree Indiana University, Master's Thesis "Accounting for Exploratory and Drilling Operations." 30, married, locate anywhere. Rodney Moore, 302 South Madison, Bloomington, Indiana.

GEOPHYSICIST—Bachelors degree geology. Two years graduate study. Seven years seismic experience including two and one-half years as party chief. Three years in South America. Desires position as senior computer or interpreter with oil company, foreign or domestic. Presently employed. Box C-389, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Age 23, wants position involving refinery engineering. Two years with major refinery on unit equipment, piping, tanks. One year western highway department. Graduate B.S. Ch. E. No location preference. Warren Carlson, 2465 Birch, Whiting, Indiana.

YOUNG LADY, graduate geologist, experienced secretary and accountant, speaks Spanish and English, desires position here or abroad. Box D-387, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

SALES ENGINEER: REGISTERED professional engineer with college degree. Design sales and field experience with drilling and production oil field equipment. Desires a sales position in the Southwest. Box D-383, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY SUPERINTENDENT / MANAGER: Complete experience Independent and Major companies in management and operation all types units, remodeling and construction. Presently employed, can be available promptly. Opportunity more desirable than salary. Highest references. Box D-385, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Age 45, 25 years experience in drilling and production operations. Supervisory experience in completion and workover operations as district engineer, tool pusher and production superintendent. Desire connection with independent operator. Will consider foreign employment. Box D-390, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT-AUDITOR, CPA. Fifteen years diversified accounting and tax experience, principally in Oil Industry. Desires change. Box D-391, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—MAPS

CURRENT East Texas Field salt water encroachment maps. In colors. Scale 1" = 2000'. $65.00 each. C. L. Anstine, Route 1, Kilgore, Texas.

LEASE AND DRILLING BLOCKS

SEE A. L. BOWLES, ADA, OKLA., FOR DRILLING DEALS, LEASES, ROYALTIES

FOR SALE: LEASES directly in trend between two producing fields. Laramie County, Wyoming . . . $5.00 per acre. M. B. Garman, 3922 Cribbon Ave., Cheyenne, Wyoming.

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky, W. P. Harley, Bowling Green, Kentucky.

80-ACRE lease in Artesia pool for sale with drilling obligation—shallow. 640 acres in Loving County, Texas—shallow, Delaware, and deeper; between Wheat Pool and Kyle Pool. Large tract in Panhandle in trend 1½ to 3 miles from a pool of ten producing wells. John P. Mathis, P.O. Box 1106, Amarillo, Texas.

WILL sell oil leases in Illinois; also drilling blocks, semi and wildcat. We specialize in Illinois. S. J. Burkitt, Moweaqua, Illinois.

NORTH DAKOTA—LEASES & ROYALTIES Inquiries invited: Curran and Curtis, Box 165, Bismarck, North Dakota.

LEASES ROYALTIES

Producing and Nonproducing

Bought and Sold—Any Area

Inquiries Invited

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6378 Clayton Road, St. Louis 17, Mo.

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Bought direct for you on your purchase order. Our lease block map and reprint of press and magazine articles clearly outlining this play mailed on request.

(Purchase orders accepted only from those connected with the oil industry or royalty business).

Wire, Write or Call

JOHN ALLEN or BILL McBIRNEY
Suite 200, Grand Pacific Hotel
Bismarck, North Dakota

(Member National Oil Scouts and Landmen Association. References exchanged).

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

SCURRY COUNTY ROYALTIES
Send for list of choice Scurry County Royalties. Also have royalties under major blocks cheap. Navarro Royalties Company, Odessa, Texas.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

ROYALTY: ½ of ⅛ good to 1965 on 4 sections on Moore & Hartley County line in Texas. $6.00 per acre. Write A. H. Hesse, Dalhart, Texas.

FOR SALE

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PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

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CALENDAR

February

American Society for Testing Materials, Committee D-2 on Petroleum Products and Lubricants, Washington, February 20-24.

Western Petroleum Refiners Association, regional technical meeting, Washington-Youree Hotel, Shreveport, February 24.

American Institute of Chemical Engineers, regional meeting, Houston, February 26-March 1.

American Society for Testing Materials, spring meeting, Hotel William Penn, Pittsburgh, February 27-March 3.

March

American Petroleum Institute, Division of Production, Southwestern District meeting, Adolphus Hotel, Dallas, March 8-10.

Texas Independent Producers and Royalty Owners Association, fourth annual meeting, Baker Hotel, Dallas, March 9.

Indiana Independent Petroleum Association, spring convention, Hotel Severin, Indianapolis, March 9-10.

American Chemical Society, Houston meeting, Shamrock Hotel, Houston, March 26-30.

North Texas Oil and Gas Association, Kemp Hotel, Wichita Falls, March 25.

Southern Gas Association, Galveston, Tex., March 27-29.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, March 27-29.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Skirvin Hotel, Oklahoma City, March 29-31.

April

American Petroleum Institute, board of directors meeting, Houston, April 3-4.

National Association of Corrosion Engineers, annual conference, Jefferson Hotel, St. Louis, Mo., April 4-7.

American Chemical Society, Philadelphia meeting, Philadelphia, April 9-13.

American Society of Lubrication Engineers, annual convention, Hotel Statler, Detroit, April 10-12.

American Society of Mechanical Engineers, Hotel Statler, Washington, D. C., April 10-14.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla., April 11-13.

National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 12-14.

American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone Hotel, Casper, Wyo., April 13-14.

American Chemical Society, Detroit meeting, Detroit, April 16-20.

Petroleum Industry Electrical Association and Petroleum Electric Supply Association, joint conference, Shamrock Hotel, Houston, April 18-20.

Natural Gasoline Association of America, annual convention, Texas Hotel, Fort Worth, April 24-26.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting, Stevens Hotel, Chicago, April 24-27.

Oil Heat Institute of America and National Oil Heat Exposition, annual meeting, Commercial Museum, Philadelphia, April 24-May 1.

American Petroleum Institute, Division of Production, eastern district meeting, Cleveland Hotel, Cleveland, April 26-28.

May

American Petroleum Institute, Division of Refining, midyear meeting, Hotel Cleveland, Cleveland, May 1-4.

Interstate Oil Compact Commission, spring meeting, Biloxi, Miss., May 4-6.

Independent Petroleum Association of America, midyear meeting, Biltmore Hotel, Los Angeles, May 7-9.

American Gas Association, Natural Gas Department, spring meeting, Mayo Hotel, Tulsa, May 8-9.

American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, May 11-12.

Gas Technology Short Course, Texas College of Arts and Industries, Kingsville, Tex., May 29-31.

June

Pennsylvania Grade Crude Oil Association, Hotel William Penn, Pittsburgh, Pa., June 15-16.

American Society of Mechanical Engineers, Hotel Statler, St. Louis, June 19-23.

American Society for Testing Materials, annual meeting Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-30.

August

Interstate Oil Compact Commission, summer meeting, French Lick, Ind., August 3-5.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas Nomads, first Monday of each month, Texas Room, Baker Hotel.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

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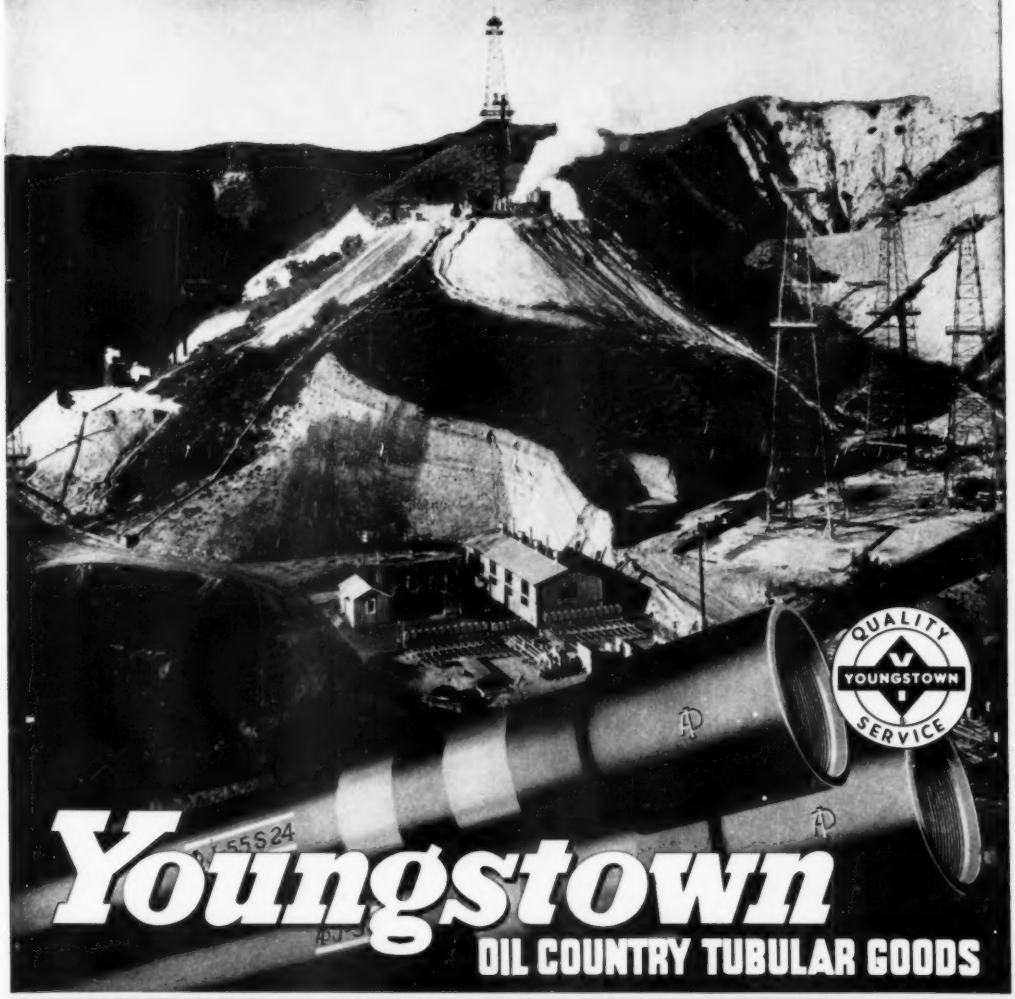

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